THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XCI. No. 2209.] LONDON, SEPTEMBER 12, 1905. [57TH YEAR. PRICE 6d.

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— *ESTABLISHED 1830.* —

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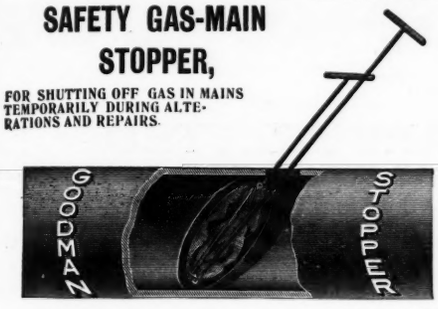

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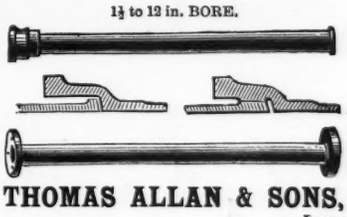

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FITTED.

CHEAP STEAM PRODUCTION.

TO THE EDITOR OF ENGINEERING.

SIR,—Some years ago we attached forced draught and special fire-bars to our two Lancashire boilers, with the object of burning coke dust. The load has grown, and last week I had the water and fuel carefully checked, with the following results:—

Water used in boilers from Dec. 9 to Dec. 16, as per Corporation meter . 79,300

Fuel used from Dec. 9 to Dec. 16: Coke	£	s.	d.
dust—41 tons 4 cwt., at 1s. 11d. .	3	19	0
Washed slack—15 tons 17 cwt., at 6s. 6d.	5	3	2
	£9	2	2

This works out at a fraction under 2s. 4d. per 1000 gallons. Can this result be beaten? I may add that the water-feed to the boilers is heated by the exhaust steam from the engines to 200 deg.

Yours truly,

C. D. LENG.

High Street, Sheffield, Dec. 19, 1904.

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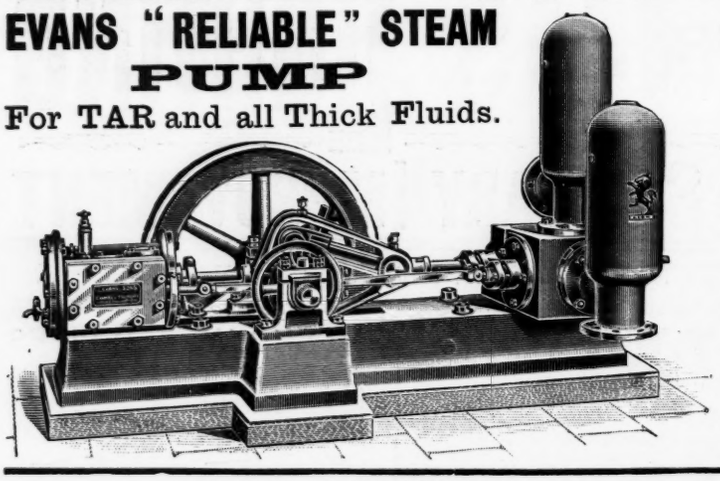

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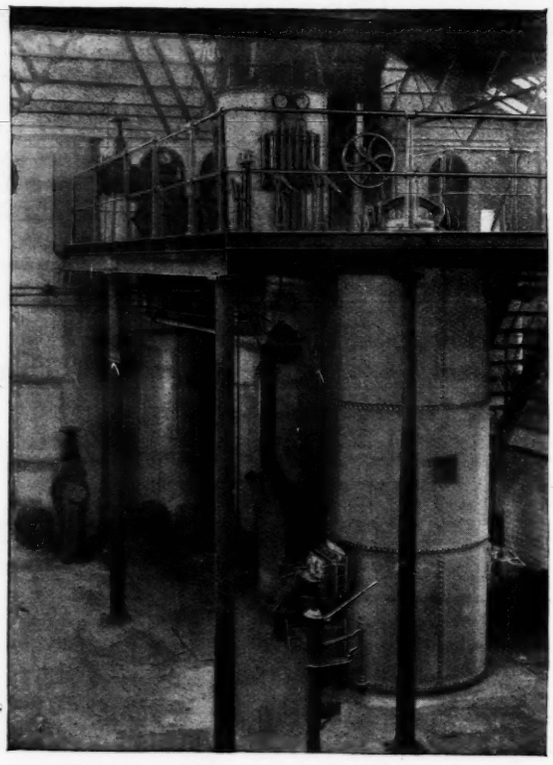

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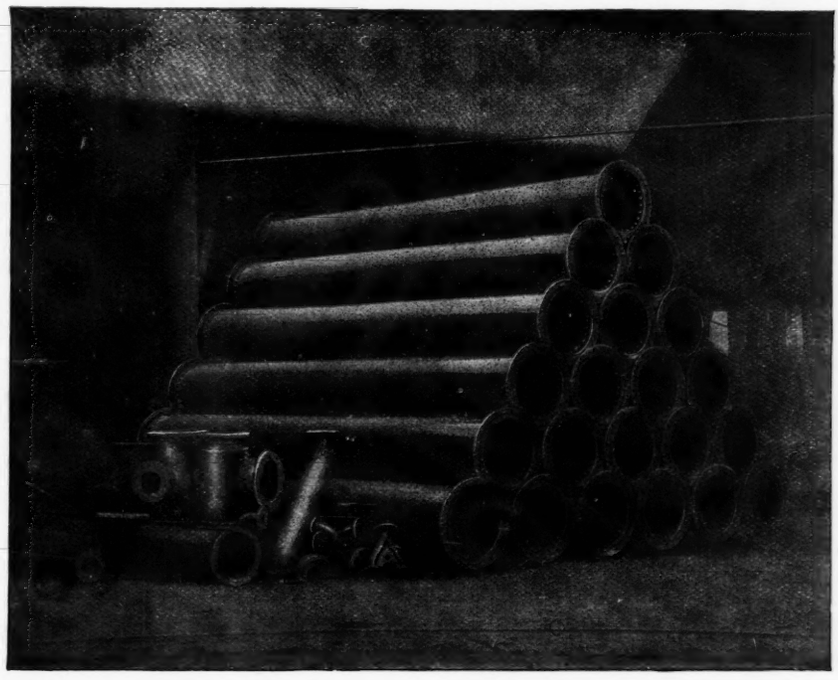

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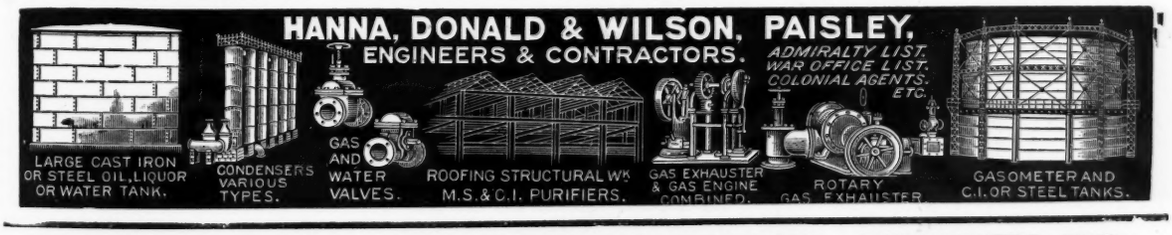
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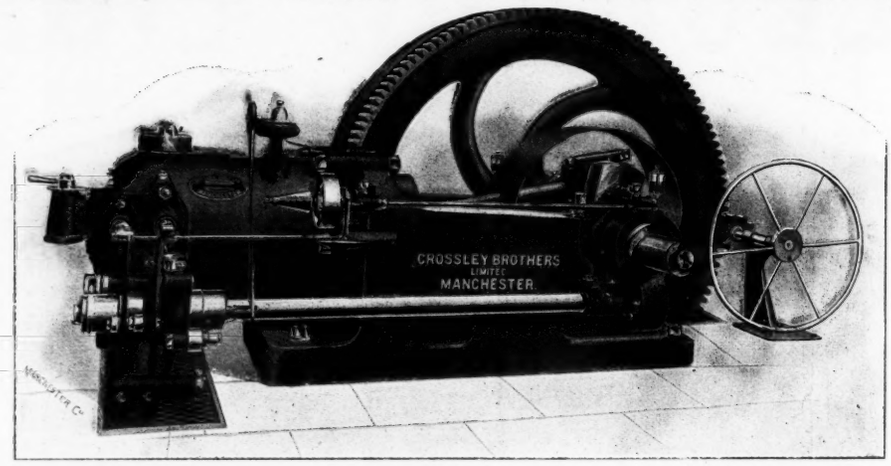

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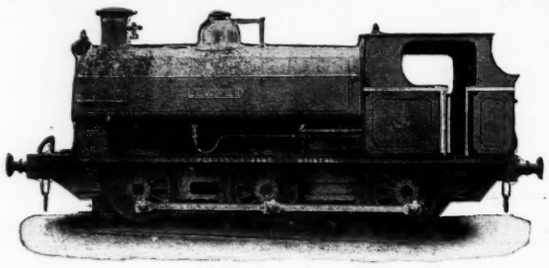

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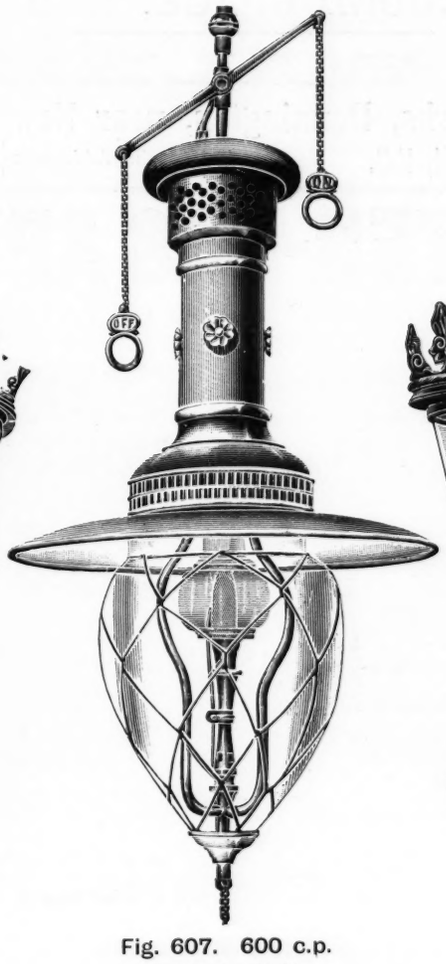

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Fig. 35a. 300 c.p.
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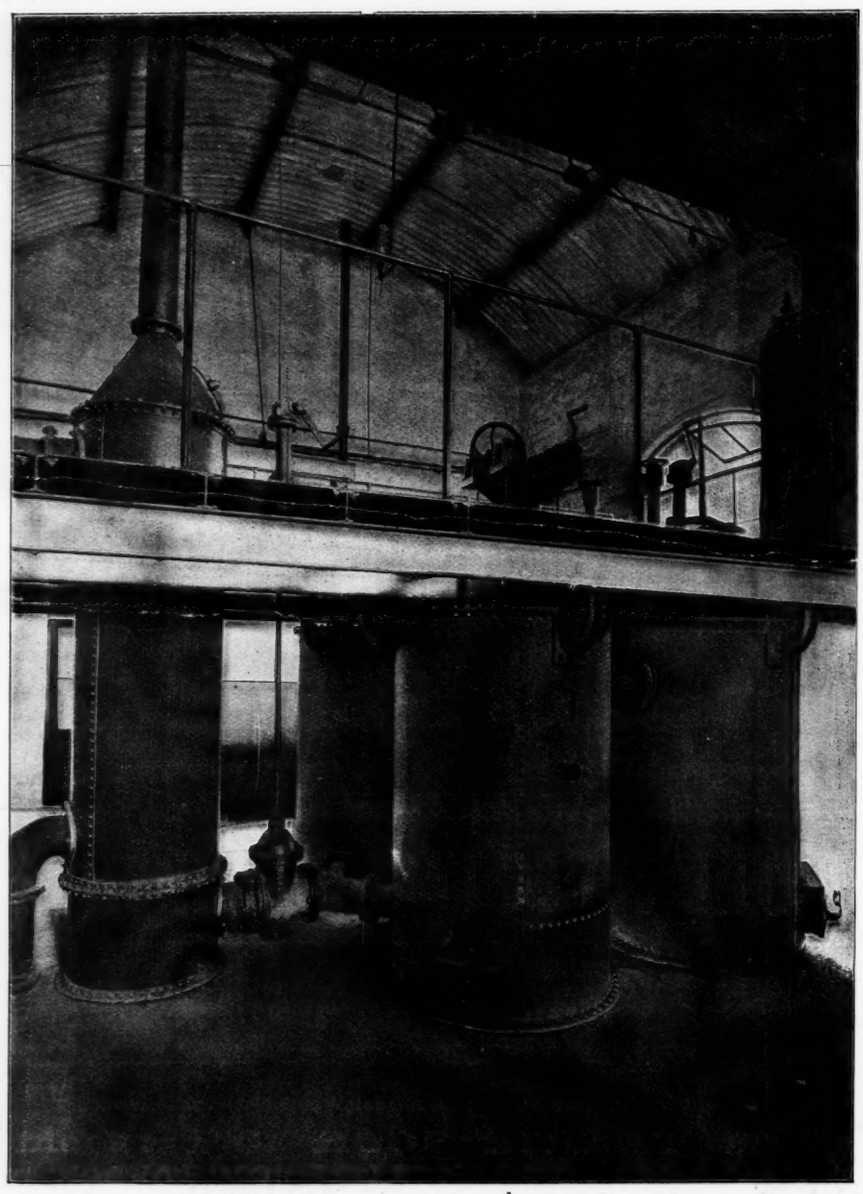
(DR. KRAMERS & AARTS PATENTS).



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For Incandescent Street Lighting.

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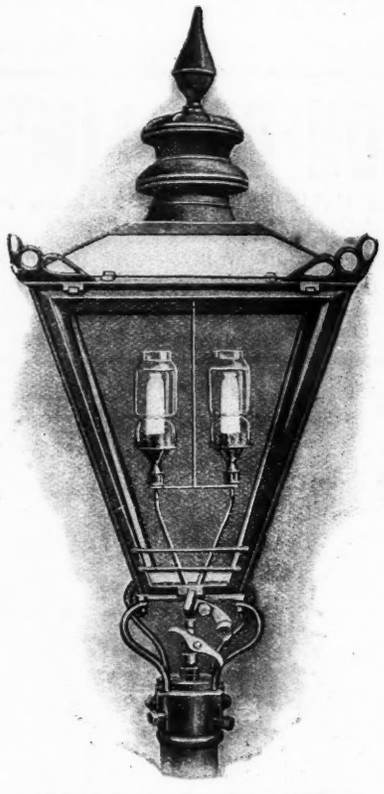

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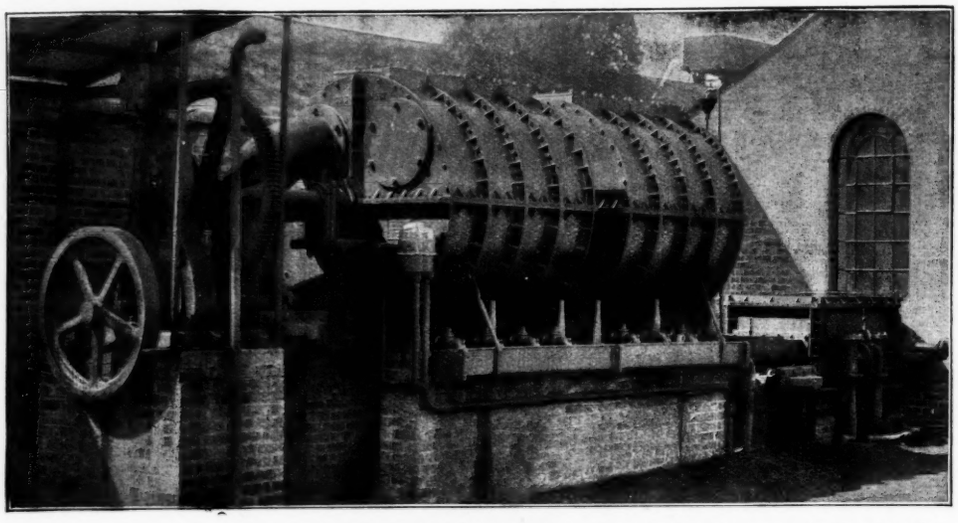

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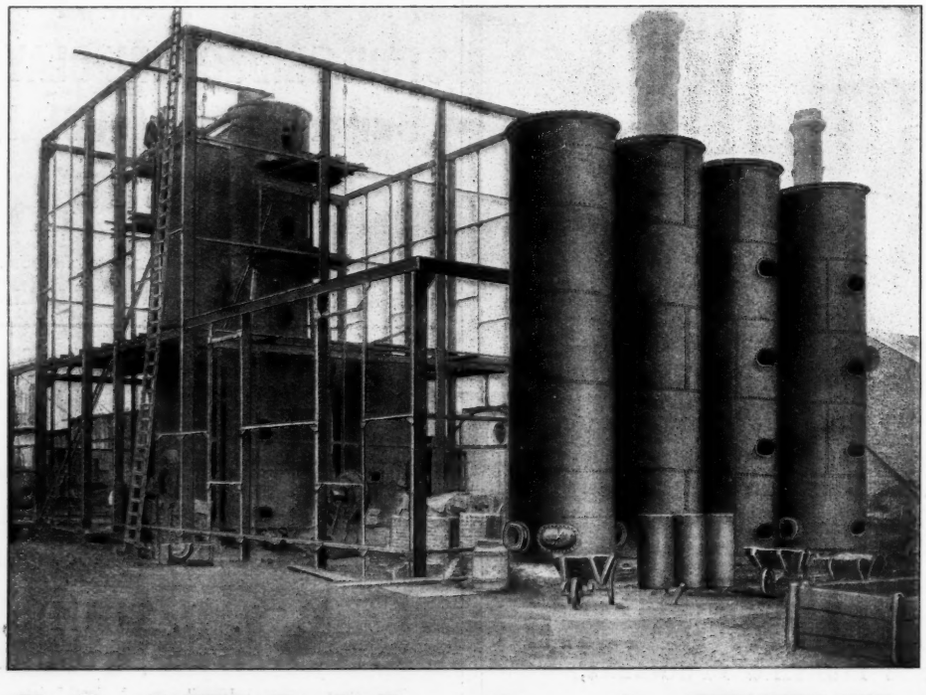

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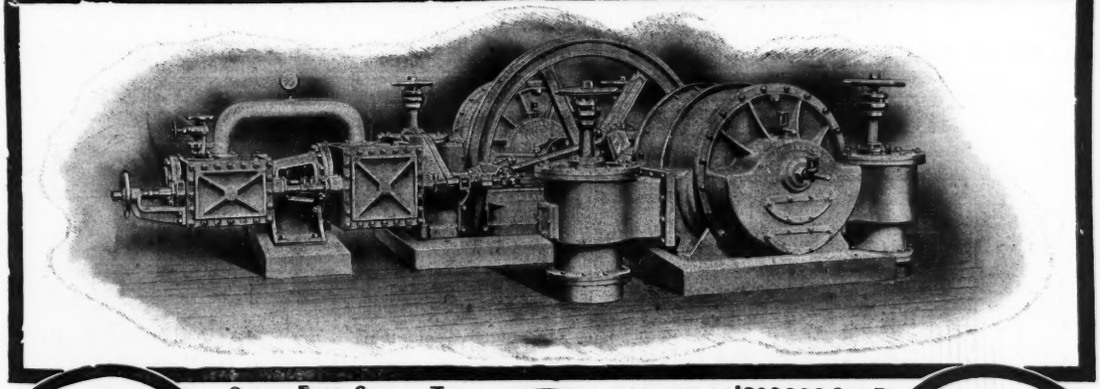

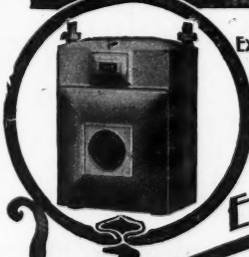

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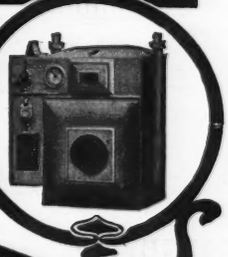

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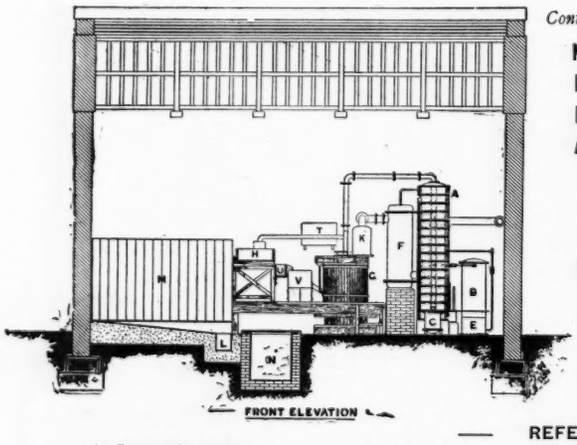

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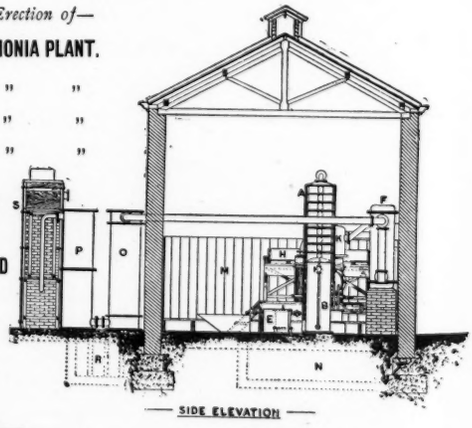

SIDE ELEVATION

REFERENCES.

A. Large Still (Ammonia).
B. Small Still (Lime).
C. Spent Liquor Valve.
E. Limeing Arrangement.
F. Heater.
G. Saturator.
H. Draining Table.
K. Lead Catch Box.
L. Mother Liquor Well.
M. Sulphate Store.
N. Acid Store Tank.
O. Condenser.
P. Scrubber.
R. Settling Tank.
S. Neutralization Plant.
T. Acid Supply Tank.
U. Mother Liquor Trough.
V. Mother Liquor Receiver.

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Wilton's Patent Neutralizing Apparatus for the Waste Gases from Sulphate of Ammonia Plant.

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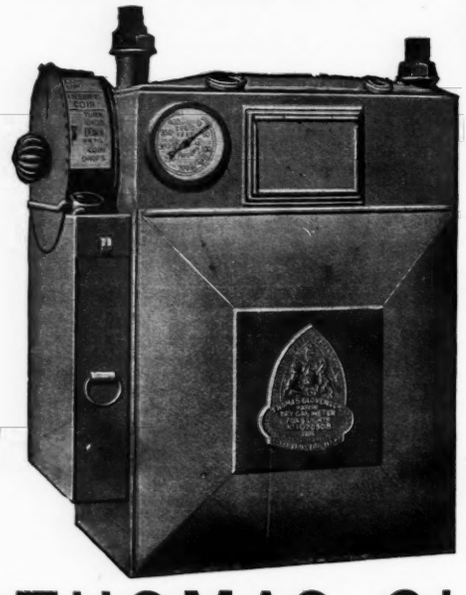

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EDITORIAL NOTES—GAS, &c.

The New Welsh Institution—The Commercial Superiority of Gas.

LOOKING back upon their inaugural meeting of last Wednesday, the members of the Wales and Monmouthshire Institution of Gas Engineers and Managers must do so with feelings of the greatest satisfaction, born of the knowledge that they have at length realized completely their aspirations, and that they have made a worthy first contribution to the technical records of the industry from their own midst. With us, their compeers of the District Associations will say, "Well done." The meeting has set them a high standard to which to live; and while we cannot hope that all their future meetings will equal it through the palpable limitations under which the Institution will labour, the sole impulse of trying to be, by collaboration, of service to themselves, their undertakings, and the gas industry generally, must be productive of good. Geographical situation alone produces for gas engineers and managers, as for most other industries and businesses, peculiarities in conditions which it is meet and to the common advantage they should consult upon; and not the least benefit conferred by these territorial organizations is the personal and helpful friendship engendered among neighbours in similar office. Upon this too much stress can never be laid. Mr. Thomas Canning, of Newport (Mon.), is the first President; and with his assistance, and the exertions of the energetic Secretary (Mr. Octavius Thomas) and his fellow officers, it will not be through any want of effort and encouragement if the new Institution does not always render excellent result from the semi-annual gatherings. Much will depend upon the co-operation of the members generally.

The first meeting was held in Cardiff; and in that great seaport of South Wales, the spirit of active commercialism abounds. The President's address befitted the town. Mr. Canning is a commercialist to the backbone; and, from the opening to the close of a long but not in a single part wearying address, the commercial side of gas supply in its relation to competitors was brought under examination, and even then was not exhausted. Not only did it carefully survey the position, and show how the gas industry excelled in offering in all directions greater value for money expended, but there were introspections and warnings, and throughout a stimulation to every responsible individual in the gas industry not to relax effort through present good fortune, but to, if it be possible, go forward with accelerated vigour. We may know that we have it within our power—as the President proves conclusively that we have—to offer greater advantages than competitors in lighting, in industrial motive power, in cooking and heating, and in other directions; but we must also recognize that these competitors—electricity and producer gas—are increasingly aggressive through the incentive given by their consciousness of the strength of the position which they have to assail. Adversity makes them bold. We admire them for it, so long as they do not deviate from straightforwardness into misrepresentation. The gas industry are quite prepared to give all a fair field; but it would be an inversion of one of the fundamental laws of commerce to show any special favour by exhibiting apathy, or presenting no resistance, to their attacks—both direct and indirect.

Mr. Canning has made it his business to personally investigate the claims of the competitors; and the tests he has applied are irrefutable. The liberal supply of material that he gives from his own ample stock of information will be of general use in the contest for the retention of custom and the obtaining of fresh business. Gas engineers and managers want all such facts at their fingers' ends. But that is not enough; there must be no rest in the effort to widen the margin of the means by which increased efficiency can be achieved. In the field of lighting, gas has far outdistanced electricity through the duty realizable per cubic foot of gas; but the electrical world are not only aggressive with the means at their disposal (upon which, by the way, they put the best complexion by quoting the highest efficiency obtainable when all is brand-new, and not the maintainable efficiency), but they are putting forth their inventive energies to produce lamps of greater economy and efficiency. Partial success has rewarded them in lamps requiring half the watts per candle power that the ordinary incandescent electric lamp claim; but the lamps are expensive and unreliable. However, present expensiveness and unreliability, and the fact that compared with incandescent gas-burners on the lighting basis they are also costly, must not be allowed to have a soporific effect on the gas industry. There are the Nernst and the Tantalum lamps; but with the ordinary "C" burner, gas could be sold at 4s. 6d. per 1000 cubic feet and then compare with lamps supplied with electricity at the low charge of 1½d. per unit. Still, progress has been made by the electricians; and though it has not brought them far on the road towards equality, the fact of the progress, giving encouragement as it does to the striving for higher things, it would be folly to ignore.

The President's comparative figures we will not attempt to traverse; they are much in accord with our own calculations, and not only calculations but actual experiences. There is only one comparison upon which we must respectfully call the President to account. We have been impelled to denounce the tactics of electricians in taking the cost per candle-power-hour of flame and other arc lamps, and comparing it with the cost on the same basis of the ordinary "C" incandescent gas-burner. Mr. Canning commits the same error, or may we not call it wrong, by comparing the intensified gas system with the glow and Nernst lamps. Perfectly true it is that 1000 cubic feet of gas for lighting purposes are equal, under the present intensified system, to 30,000 candle-hours; but the intensified system is not ordinarily used in situations where the incandescent glow lamp or the Nernst lamp is employed. Burners of the high-class type of the Kern or the common "C" are more applicable. Taking, however, only an ordinary "C" burner giving an efficiency of 18 candles per cubic foot of gas, then 1000 cubic feet would be equal to 18,000 candle-hours. With the electric glow lamp, taking 4 watts per candle-power, 72 units of electricity would be required to produce the equivalent candle-hours. On this basis, gas could be sold at 9s. per 1000 cubic feet to equal electricity at 1½d. per unit used with the ordinary incandescent electric lamp, and at 4s. 6d. per 1000 cubic feet to equal electricity at 1½d. used with a good conditioned Nernst lamp. Mr. Canning's figures, it will be seen, are much larger than these through taking the intensified lamp as the basis for gas. But we desire, by not conniving at a similar method to that adopted by electricians to show a superlative result, to maintain unaffected the ground of our protest against the injustice that in more than one quarter it has been sought by such means to inflict upon gas. It will be observed, however, that in earlier parts of the address, the President in a cost comparison, taking electricity at 2d. per unit (which, as he points out, is below the average price charged for electricity for public lighting throughout the kingdom), slightly takes the edge off this criticism by pitting a Nernst lamp against the Kern burner; but the other comparison is the more striking.

The fulness of the address, and its variety of subject-matter, preclude a comprehensive comment. But, being so much in accord with the President, gives relief from the necessity of going but very little farther into the questions treated upon. Next to what Mr. Canning had to say on the competition of electricity, his attack on the extravagant claims of the makers of suction gas-plants will be found most refreshing. In such plants town's gas for power purposes has a competitor that is much alive, and one that is being tenderly fostered by some of the manufacturers of gas-engines. The drawbacks of these plants are set out; and much that is left unsaid by the makers of the plants is said, and said plainly, by Mr. Canning. His experience enables

him to assert that for power up to 50 brake horse power, coal gas at 2s. 6d. per 1000 cubic feet is more economical than, as well as superior to, suction gas; and beyond 50 and up to 150 brake horse power, coal gas at 1s. 6d. per 1000 cubic feet is more economical than, as well as superior to, suction gas. Touching the methods brought into operation in the preservation and development of the interests of a gas undertaking, weight is thrown by Mr. Canning upon the efficacy of mantle and burner maintenance, and the systematic maintenance of cookers. Gas-fires, too, ought to be brought under close inspection, especially at this season of the year. In inspection and rendering assistance to consumers, there are many gas concerns that are not taking the breadth of view that it was expected they would do a few years since; and the worse for them.

There were two papers read at the meeting. If discrimination may be allowed, the most important was that by Mr. Edward Jones, of Pontypridd, on the Fiddes-Aldridge simultaneous discharging and charging machine at the Treforest works. While, for acceptable reasons, Mr. Jones could not give reliable figures as to cost of working—his conditions and the absence of auxiliary machinery only permitting of spasmodic action—there is much that is satisfactory concentrated in the statement, after his lengthened experience, that "the discharging has been perfect, while "the charges are uniform and level." There is no doubt from this that the machine continues to work well; but it wants greater scope and plant contributing to speed, for it to fully prove itself. Those conditions it is to get at Liverpool. The effect that the incandescent burner has upon gas consumption was well exemplified by the actual percentages of decrease quoted by Mr. Thomas Acland, of Llanelly, in his short contribution. His figures confirm the 37 per cent. quoted by Sir George Livesey at the recent meeting of the South Suburban Gas Company. In conclusion, it must be repeated that the whole meeting formed a fitting and promising opening to a career that we hope will be fertile in usefulness to the members as well as beyond their circle.

The Retention of the Power Business.

ABUNDANT evidence has been forthcoming since our article on this subject in the "JOURNAL" for the 22nd ult., that the question is a very live one in the administrative circles of the gas industry. The instances of what has been done in the matter of price as cited in the article, laid no pretension to completeness. They were merely quoted to indicate the course of events and the measure that managements are placing upon the necessities of their own particular situation to preserve and extend their motive power business. It is fairly certain that some of them will have to still moderate their views. Included in Mr. Canning's address to the Welsh Institution (referred to in the preceding article) are some calculations which, taking the price basis only—without evaluating those visible and indisputable advantages that lie in the ability to command the operating medium by the mere turning of a tap—show the charges up to certain horse powers that he has worked out as being commercially competitive. Of course, one set of prices cannot have universal application; nor can it be hoped that the ultimate penny in charge, *plus* the external advantages of the ordinary gas supply as compared with the home-made supply of much inferior gas, will be sufficient for the purpose in view. There must be a little margin between the respective price values, without other considerations, for the one competitor to gain superiority over the others.

The President of the Institution of Gas Engineers (Mr. Charles Wood) was at the Welsh meeting; and he told how, at 1s. 10d. per 1000 cubic feet in Bradford, the ordinary gas supply could not always keep out the suction-gas plants. We cannot expect to have all the good luck on the side of the gas industry; and such opposition as Mr. Wood has met with is just the thing to act as an excitant, and keep one from relaxing effort. Experience, too, of the competitors on the part of a few manufacturers in such a place as Bradford has its advantages. Only within the past few weeks, a couple of instances came to our knowledge of manufacturers who have displaced their suction-gas plants and taken to the ordinary gas supply in two towns far distant from each other; and it was not a question of cost with those manufacturers. To which gas in those towns—the ordinary or the produce of the suction plant—is the example of those two manufacturers likely to be most beneficial? An answer is not required here. But such cases of abandonment must not affect the generous consideration of price, as the circumstances in those particular instances may not altogether apply elsewhere; and, in its improved form, the suction type of plant is, notwithstanding what has just been said, the most powerful rival to the gas industry in this branch of business. But still what we have mentioned shows that first successes in the installation of the suction-gas plant may—the gas undertaking leaving nothing undone to retain business in the meanwhile—prove eventually to be blessings, though originally in disguise. A parallel is found in street lighting by electricity. Experience alone has put a check on its extension; and the reaction is exceedingly favourable to gas. Electricity is also prosecuting an active competition for power; and the electrical papers are keeping a keen eye on the claims of gas power in its various forms. The electrical power companies, too, are getting to work in various districts; and we may remind readers that, where their cheap electricity is employed for power, a not inconsiderable part may be used for lighting purposes. In manufactories, this may also represent a large loss of lighting business.

Believing in the force of example, we may give prominence to known additions to those gas authorities and companies who have already been mentioned as having lately specially reduced their motive power tariffs for gas. The Huddersfield Corporation Gas Committee have adopted a scale of 2s. 3d. to 2s. 1d. per 1000 cubic feet, less 5 per cent. for payment within one month; the Croydon Gas Company are allowing a discount of 3d.; the Peterborough Gas Company have dropped from 2s. 9d. to 2s. 6d. per 1000 cubic feet to consumers of 25,000 cubic feet per quarter; and the Sleaford Gas Company, Limited, have also adopted 2s. 6d. for 25,000 cubic feet per quarter, and for quantities below that the price is to be 2s. 8d. In considering the latter charges in connection with some of those quoted on the 22nd ult., account must be taken of situation and the relatively small character of the business. The last issued report of the Wolverhampton Gas Company brings to mind the fact that they lowered the price of gas for motive power from last April by 6d. per 1000 cubic feet. We have faith that, in most places, the sagacity of the administrators of the gas business will not allow their undertakings to take a backplace in this competition for motive power.

Labour's Parliament.

THE voice of labour has been raised in the past week in the Potteries district; the town of Hanley having been chosen as the scene of the annual Trades Union Congress. But when the voice of labour is raised, unison is out of the question; and, in agreement with precedent, the result of this annual flow of language has been a negative one, excepting in so far as it has produced the usual collection of rhetorical gems and queer metaphor. There must be some enchantment about these congresses for the delegates of the Trades Unions to be drawn to them in the manner they are; and we fear it is to be found in the cheap outing it affords, the hope of a certain amount of equally cheap publicity, and the opportunity it offers for airing grievances in embroidered language, the choice of which is not always marked by a depth of either sense or compatibility. Nothing of solid worth emerges; and this fully applies to this year's congress. Of variety in subjects discussed, there was no lack; and of the amount of ventilation given to each, there can be no ground for complaint. But there it all ends. On one or two questions from which valuable assistance to useful legislation might have issued, the rule requiring a two-thirds majority defeated the opportunity for the removal from the proceedings of the slur of barrenness. We are not surprised that there is grumbling, deep and loud, about the congress being on the decline—not perhaps in attendance, but certainly in utility. Point is given to this by the successful attack that our old friend Mr. Will Thorne and Mr. Naysmith (of the Sunderland Gas Workers) have made on the "underhanded "work" in the congress and outside in the public-houses in connection with the elections to the Parliamentary Committee. A resolution at their instance was passed which will expel anyone found violating the Standing Orders in this respect at future congresses. It is not a state of things that will inspire confidence to learn from Mr. Thorne that the delegates cannot trust each other "at five yards' distance "on the floor of the house."

The past parliamentary session has been one in which

the Government devoted a good deal of public time to the cause of labour; but it seems to be quite the proper thing at the congress to be "again" the Government in all ways. Nothing that they have done or tried to do meets with the approval of the Trades Unionists. There was the Unemployed Bill that the Government and the House of Lords went out of their way to pass before the prorogation of Parliament; and there is the promised Commission to inquire into the Poor Law. No time was found at the congress for any acknowledgment to the Government for these things; but, respecting the Commission, the Trade Unions are not satisfied that it will do its work efficiently without their representation upon it. That is a matter Mr. Balfour has under consideration. The congress has painted in more vivid colours than ever that no peaceable means that are devised to advantage labour will appeal to the inflamed notions of the leaders of the Trades Unions. Never for many years have there been such quiescent times in regard to labour. Disputes have over a long period been on the decline; and arbitration and conciliation in their settlement are working, in this country as in France, towards making our social conditions in relation to labour more tolerable. But at this conference, the Committee, in their report, crystallized the views that the democratic and the socialistic firebrands, with their "business" on the wane, carry through the country. "We find," they reported, "capital arrayed against the workers, organized as it has "never been before, supported to-day by the influence of an "unjust law." Fine words in these days of labour calm, which calm shows that labour has not much to complain of in regard to capital.

The Trades Unions, or those at their head more than the rank-and-file, it is quite apparent, cannot see any good in anything that is not aggressive; and nothing will gratify them that has not about it the smell of a fight, nor will Parliament succeed in enacting anything that will please them unless the tenets of Trades Unionism are held inviolate, and the law is perpetually being strengthened as against the employer. In short, a special type of legislation of their own compounding is the only thing that will satisfy. Industrial conciliation and arbitration are too namby-pamby; but by a considerable section of the rank-and-file, for obvious reasons, the advantages are being better appreciated than, also for obvious reasons, they are by their leaders. A resolution on the subject was moved at the congress by Mr. Ben Tillett, who is one of the few of the leaders who have long since acknowledged that mediation and arbitration are satisfactory, and tend to national efficiency and prosperity. But it failed to secure the necessary majority, although there was a majority for it in the total vote. In the promotion of his purpose, we wish Mr. Tillett success, and hope that his prediction that the resolution will be passed next year will be fulfilled. The congress still considers improvement is required in the law as to workmen's compensation and employers' liability; and so do we. But our views may diverge somewhat from those of Trade Unionists. There is terrible soreness, too, over the Trades Dispute Bill. The fate of that Bill, said the President (Mr. J. Sexton) threw "a lurid light "upon the boastful but absolutely fraudulent character of "the House of Commons." This was the measure for the legalization of "peaceful picketing;" but the definition of "peaceful" picketing was not found by the Trades Unions. Fortunately, however, a "lurid light" was thrown upon the "absolutely fraudulent character" of the interpretation that would have been put on the adjective by the withdrawal of the Trades Unions from the consideration of the Bill in Committee when a proviso was inserted "that no person "shall, after being requested by any person annoyed by his "conduct, or by any constable instructed by such person, "to move away, so act as wilfully to obstruct, insult, or "annoy such person." This was fatal to the Bill in the eyes of the Trades Unionists. But it was what was wanted to obtain the Unionist definition of the form of picketing that the Bill described as "peaceful." Invective of the most churlish order was all that could be found at the congress to fit the Government; and for anything that had been done that was allowed to be passably advantageous to labour—well, that was, of course, entirely brought about by the pressure of the Trades Unions.

There is, however, going to be before very long a change, or the delegates at the congress hope there will be; for the immediate work is to be the uniting of the forces of labour so as to materially assist in increasing the number of direct labour representatives returned to Parliament at the next General Election. Imperial Parliament has something else to do besides attending to class legislation; and it is time that those who are considered fit to act as delegates at the labour congress fully understood this. Their methods of improving the conditions of the working men take a tortuous course, and have most inconsequential endings. Sir George Livesey and others have shown a shorter route and a single and more direct method, which includes the protection of the interests of labour. Glancing over last week's doings, if the members of the Trades Unions are pleased with the work of their delegates at Hanley, they are very easily satisfied.

A Legal Absurdity.

A curious situation exists at Seaton (Devonshire), where the Urban District Council have been invited to give facilities for the provision of electric light. From particulars given elsewhere, it appears that the originator of the scheme is an Exeter engineer, who apparently thinks that this little watering place may, like some others on the same coast, be more or less successfully exploited in the interests of those persons who are anxious to demonstrate that no holiday resort is of any account which does not range itself on the "progressive" side in the matter of lighting. To the casual visitor, Seaton does not seem a very promising field for an experiment of this kind; but the Exeter gentleman probably knows his business, and if he thinks differently we are not disposed to challenge his judgment. His intention, he says, is to apply for a Provisional Order, and form, if possible, a local Company to give effect to it. A week or so ago, he laid his proposal before the District Council, with the object of enlisting the sympathy and support of that body, or at least securing their benevolent neutrality. In the course of a brief discussion, it was pointed out that shareholders in the local Gas Company were precluded from voting on the scheme, and would have no voice in determining what attitude the Council should take up in regard to it. The reply was that all the members of the Council are gas shareholders! Under these circumstances, there was nothing to be done but adjourn the meeting until the legal adviser of the Council has had an opportunity of considering what, if anything, can be done. It is possible that legal ingenuity may find some way out of the dilemma. If not, the representatives of the ratepayers of Seaton will be in the farcical position of being unable to pronounce a decision one way or another upon a matter which closely concerns the whole community, and the town will be practically at the mercy of anyone who thinks it worth while to exploit it. Some remarkable results have followed from the legal decision that shareholders of gas companies are not competent to speak or vote on electric lighting matters coming before the local authorities of which they happen to be members. The case of Seaton, however, reduces it to an absurdity.

The Oil Supply and the Insurrection at Baku.

The insurrection at Baku, accompanied by its terrible massacre and destructive incendiarism, which has horrified the whole civilized world, brings in its train the question of the effect upon the oil supply, and this concerns the gas industry. Telegrams received in this country report that work at the Baku oil-fields is practically at a standstill; that at least 250 oil-wells have been fired; and that the work of the incendiaries was continuing at the close of last week. Many months, too, it is stated, must elapse before the wells can again be made productive; and even then the output will probably be considerably curtailed—in short, for some time to come, the Baku petroleum industry is practically annihilated. Opinions in the oil-market differ on the point as to whether this condition of things will have any serious bearing on the price of oil; the wirepullers do not publish to the world the line of action they are likely to take. On the one side, we are told that the production of oil has developed to such an extent during the past few years, that there can be little fear of the present trouble having any marked effect upon prices; and moreover that it will give Armenia, Galicia, Borneo, Sumatra, and other oil-yielding countries the chance they have for years been waiting for. But, if it is true that stocks at Batoum are practically exhausted, the potent competition of Russian oil to the American commodity has been stopped, for some time to

come, by the work of sedition; and those controlling the American supplies will not overlook this. Care must mark the action of those who may be desirous of entering into fresh contracts for oil in the near future, for immediate information of sufficient trustworthiness to be of any use, is difficult to procure.

The Troubles of a Town Council.

Largely as the doings of the municipalities are brought to public notice nowadays, there can be few (if any) bodies of ratepayers who have had more to exercise their minds in this respect than those at Warrington. It will be remembered that in his evidence before the Joint Parliamentary Committee on Municipal Trading, in 1903, Mr. S. Norbury Williams, the Elective Auditor for Manchester, dealt at some length with the conduct of municipal affairs at Warrington; and since then an inquiry has been held (extending over twelve months) into allegations of trading by members or officials of the Council with the Corporation. About a year has elapsed since the issue of the reports of the Commissioners who made this inquiry; and now once more attention is arrested by the doings of the Warrington Corporation. In the first place, as is notified elsewhere to-day, an Investigation Committee has been appointed to go thoroughly into the question of a waterworks contract about which there is a dispute with the Contractor. The amount involved is a large one; but as the matter is at present *sub judice*—it will certainly go before an Arbitrator, if not into Court—there is, of course, some difficulty in publicly discussing it. It seems impossible not to regard the appointment of this Investigation Committee as being somewhat in the nature of a vote of censure on the Water Committee; but inasmuch as there is clearly a large amount of dissatisfaction at the existing state of affairs, an inquiry cannot well do any harm, and may be productive of much good. An adequate examination of all the documents bearing on the contract could not possibly be undertaken by the whole of the Council; hence the necessity for the appointment of a small Committee. Some slight idea of the work they have before them will be gathered from the statement that the papers bearing upon the question weigh about a hundredweight and a half. Serious, however, as this affair may conceivably turn out to be from a ratepayers' point of view, there is another very much more serious item of news from the same town to which we regret to have to refer. The "JOURNAL" frequently finds itself unable to agree with the sayings and doings of town councillors; but this is upon matters of policy and opinion. The standard of public life in this country is a high one; and it is seldom indeed that failure to live up to it has to be chronicled. But at Warrington, we are pained to learn, such a failure has been more than hinted at; for the Town Council have applied to the Attorney-General for leave to commence legal proceedings against two of the members for alleged corrupt practices. This decision has been come to on the advice of a Committee, and also on that of Mr. J. E. Bankes, K.C. However much the necessity for the application may be deplored, the Council are to be congratulated upon their determination to do what they can to uphold the standard to which we have referred.

The Minimum Wage Again.

Much occupied as the Warrington Town Council have been with the matters to which attention has just been directed, they have still found time to discuss at great length a subject which now presents a somewhat familiar aspect—the minimum wage. In this case the proposal was that no able-bodied man employed under the Corporation, and having reached 21 years of age, should be paid less than at the rate of 24s. per week. Whether or not the particular time of the year had anything to do with the introduction of the matter, it is impossible to tell; but, at any rate, the resolution met with scant favour. The Mayor pointed out that scavengers are now paid 17s. a week; and he asked the mover of the resolution if he had not made a mistake in naming 24s. a week. He suggested that it should have been 24s. per day. No public body, of course, should underpay their employees; but attempts to raise the pay of municipal workers above the current rates for like employment by private firms in the district, seem to be manifestly unfair. One of the Warrington councillors said some of the working men of the town felt that, while they themselves received only 20s. a week, it was not right that they should contribute their share to the rates to pay a similar class of men who were receiving more than they were; and though this is perhaps only one aspect of the matter, it is a view that councillors, as representing the interests of the ratepayers (indirect as well as direct), are bound to take cognizance of. It was shown that the adoption of the resolution at Warrington would have meant an increased expenditure of £2080 a year, or an addition of 2½d. in the pound to the rates; and it was urged that a better plan to help the working people would be to reduce the rates, and thus attract more manufacturers to the town, instead of raising them and so driving people away, as they were doing. Under present conditions, this looks very like a counsel of perfection; but if it is impossible to reduce the rates, the Corporation have at least declined to increase them by the adoption of the minimum wage.

Gas Supply in Australia.

The reports published in this issue of the "JOURNAL" show that the gas industry is in as flourishing a condition on the other side of the world as it is on this; the workings during the past six months having been of a generally satisfactory character. In Sydney, which is supplied by the Australian Gaslight Company, the increase in consumption was not so great as that for the corresponding period of the previous year; but still there was a growth both in the quantity of gas used and in the number of consumers. If the advantages which we enjoy on this side are shared by gas undertakings in the Antipodes, the disadvantages also seem to be somewhat alike. An additional expenditure for one Company in eight years which now amounts to £25,000 per annum, resulting from taxation and increased wages, is a pretty heavy burden, even in these days of high rating and labour legislation. And, of course, it is the gas consumers who have to suffer, by being obliged to pay a higher price for their gas than would otherwise be the case. In Melbourne, also, the progress is sure, if not so rapid as those interested in the undertaking might wish; and a further incentive to consumption has been created by a substantial reduction in the price of gas used for power purposes. The speech of the Chairman at the recent meeting of the Company shows that those in authority are fully alive to the importance of the day-load; a considerable proportion of his remarks being devoted to the hire of gas-stoves and the encouragement of the use of gas-engines. Dealing with the former, he clearly demonstrated the great advantage which accrues to the Company from the hiring-out of gas-stoves, even though it is found impracticable to make the rent charged for the stoves cover the cost of repairs and renewals. The stove consumption is a valuable portion of the business; being responsible, as it is, for nearly £20,000 of revenue a year, apart from the amount received for hire, while the cost of upkeep (over and above the rent charged) is only a few hundred pounds each half year. Another point of resemblance between the Australian companies and home undertakings is the popularity of the prepayment meter, large numbers of which are being installed, to the benefit alike of the Companies, the consumers, and the houseowners. In connection with Australian results, mention must not be omitted of the Perth (W.A.) Gas Company, who report increased consumptions of 12 per cent. in the gas branch of their business and of 27 per cent. in the electricity department.

A Doubtful Expedient.

As was expected, the Torquay Town Council decided last week to apply for the Local Government Board's sanction to their modified scheme of expenditure on the electricity undertaking. Instead of spending £42,000 on the erection of a new generating station, it is now proposed to lay out £9500 on enlarging the capacity of the existing works. It remains to be seen whether the Local Government Board will think any better of the new scheme than of the old one. According to the estimate of the Inspector who held the last inquiry, the expenditure of £42,000 on the proposed new station would have involved the ratepayers in a loss of £2290 per annum. The effect of the new proposal can hardly be so immediately serious as this. Indeed, if the estimate as to the revenue from the proposed tramways is fulfilled, the income ought to be at least sufficient to cover the charges on the new capital outlay. On the other hand, it is reported by the Electrical Engineer who was asked to advise the Corporation that, if the past average rate of increase in demand for electric current is maintained, the proposed scheme will only

provide for the requirements of three or four years. This is a point which cannot fail to be noticed by the Local Government Board. The Chairman of the Electric Lighting Committee (who is evidently chagrined by the failure of the more ambitious scheme), even when moving the adoption of the new proposal, laid stress upon its temporary nature. He said that if the Engineer's expectation was fulfilled, they would have a further increase of superseded plant; and that, therefore, it was not from a commercial point of view a wise proceeding. In opposition to this, it was argued that the demand for electric lighting would not increase in future in the same degree as in the past, and that the anticipations of the Engineers as to the need of further extensions in the immediate future will be found to be unduly optimistic. The Council were divided on this issue; but while a minority was in favour of dropping the scheme and leaving the Tramways Company to shift for themselves, the majority preferred to make another attempt to secure the profit which it is imagined the tramways business is going to yield. They consequently voted for the scheme. No doubt the Local Government Board will give full consideration to the whole of the arguments; but in face of what the Corporation's own expert and the Chairman of the Electric Lighting Committee said, it will be surprising if the new scheme fares any better than the old one. It is certainly remarkable that the Corporation's only real hope of justifying the scheme rests in proving that the demand for current will not greatly increase in the near future.

The Olympian Electrical Exhibition.

The gas industry may take it for granted that the electrical manufacturers and all concerned in the promotion of the Electrical Exhibition—not excepting Messrs. Bridges and Smith, who threw so much energy into the Earl's Court Gas Exhibition, and are now very properly applying the experience there gained in the service of their new patrons—are doing their utmost to make a huge display at Olympia. The exhibition will open on Sept. 25 and will continue to Oct. 21; and the number of exhibitors so far registered exceeds 140. A circular has been issued giving information about the exhibition, and posters announcing the display are getting about, showing three extremely giddy-looking ladies (emblematical of the capriciousness of electricity) madly whirling round with loose electrical wires (illustrating extremely bad workmanship) in their hands. The design has not a very businesslike effect; but the attendance at Olympia may be improved rather than lessened thereby. We think, however, it may be safely said that it will not be the frolicsome suggestiveness of the poster that will attract members of the gas profession to Olympia. Many will without doubt be interested visitors. They are mostly well up to date as to the developments that electricity has effected; but there will be a natural curiosity, after their own successful exhibition of last year, to see the kind of display that the electrical world will make, inasmuch as it is now thirteen years since an electrical exhibition on a large and comprehensive scale has been held in this country. As the informing circular before us says: "During that period vast strides have been made in the application of electricity to all requirements." No one will dispute the "vast strides," but the "all requirements!" We pass the statement with very grave doubts. As to a limited number of requirements, the continued high cost of electricity for illumination has—more particularly lately—been operating detrimentally to progress in this direction; and for industrial motive power, there are fresh and serious competitors. Something is going to be done at this exhibition to give encouragement to cooking and heating by electricity. It is badly wanted. It is the inflated view of "many engaged in the electrical industry that the advance in the adoption of electricity for cooking and heating has not made that progress which its *superiority, in many respects, over all other methods* would seem to promise." This is not from the circular; but from another source. They confess themselves innocents who believe that, with such marvellous superiority, anything could stand in the way of progress. We hope that the exhibition of cooking and heating appliances will be accompanied by demonstrations of their capability. There are to be scientific lectures during the run of the exhibition under the auspices of the Institution of Electrical Engineers. If there is little that is new in the lighting, motor, and cooking and heating sections, there will be much else to interest. There is to be an electrophone concert room, telegraphy (including the Marconi apparatus), telephony, and so on, not forgetting military bands.

Venerable Lamp-Posts.

Mr. Edward A. Harman, M.Inst.C.E., the Engineer and Manager of the Huddersfield Gas-Works, writes as follows: With reference to the interesting note published in the last issue of the "JOURNAL," p. 610, anent the lamp-pillar dated 1825 recently discovered by Mr. Baldwin at Gainsborough, I have come across similar cases of antiquity. Some lamp-posts have been removed from the district and brought into the works in perfect condition—to all intents and purposes, as good as new. The founder's name upon one is "Cawood, Leeds, 1821." The Huddersfield Gas-Works were built by Messrs. Cawood and Son, of Leeds, in the year 1821; and therefore it appears these are some of the original posts.

The Work of the Reichsanstalt in 1904.

"Engineering," in a digest of the work of the Reichsanstalt, gives the following particulars of the work of the Photometrical Department during last year. Herren Brodhun and Liebenthal tested 109 Hefner lamps of various types, with or without visor, flame-meter, and spare wick; 257 electric incandescence lamps; 3 osmium lamps; 8 Nernst lamps; 24 incandescence gas-lamps; 45 spirit glow-lamps; 18 candles; 1 Weber photometer; 2 petroleum samples; &c. A new intensity gas-burner, combined with a thermo-battery which drives the small fan controlling the feed, is favourably commented upon. The lamp consumes 1·1 litres of gas per Hefner candle per hour. A gas-burner, with horizontal mantle, did not prove economical. The Deutschlandwirtschaft-Gesellschaft having offered prizes for spirit glow-lamps, fourteen types of these lamps (three samples of each) were submitted for long duration tests. Nine types were table-lamps with wicks, and five ceiling lamps without wicks. A pilot light was used in all the lamps, most of which stood the 500-hours' test. The spirit consumption was about 2 grammes (in the best case 1·1 grammes) per candle per hour; so that the feed would cost about as much as with good petroleum lamps. The comparison between the ten-candle pentane lamps, the Carcel, and the Hefner lamps, is nearly completed.

Deterioration of Bookbinding Leathers.

Mr. H. E. Jones, writing from his private address at Ongar, on the subject of the article under the above heading which appeared in last Tuesday's "JOURNAL," says: "I am reminded to give you a personal experience, with samples, refuting the general or particular allegation of the injury to leather by gas. Sample No. 1 (very rotten) is from bookshelves I put up in this house 12 years ago. Sample No. 2 (excellent condition) is from shelves I found here 23 years ago, which had been there quite 10 years before then. Now for the gas part of the story. I put a gas-bracket up 23 years ago, and later a gas-fire in the grate; and the good leather was within 4 feet of the bracket and fire, and well above them. The rotten leather is from the shelves 10 feet from the gas, at the same height from the floor as the other, but near a garden door giving excellent ventilation, and therefore all in its favour. It is obvious that, although the patterns are similar, the dressing or preparation of the leathers must have been very different. At any rate, the 12-year old bookshelves need new leathering, but the 23-year old, living nearer the gas, is good for another 25 years. My bookbindings tell the same story. I have old sporting books, bound in the early part of last century, in excellent condition; while many much later hardly bear opening and shutting. I may say the gas is *not* purified by lime, but is cheap—3s. 4d. per 1000 cubic feet—for a village works, because the capital outlay, like the leather, has been well done."

The Potentiality of Radium.—In the course of the second part of the Presidential Address of Professor G. H. Darwin, F.R.S., to the British Association, who have held their meeting this year in South Africa, he referred to new sources of heat, and remarked that the recent marvellous discoveries in physics show that concentration of matter is not the only source from which the sun may draw its heat. He pointed out that radium is a substance which is perhaps millions of times more powerful than dynamite; and it is estimated that an ounce of it will contain enough power to raise 10,000 tons a mile above the earth's surface. Another way of stating the same estimate is this: The energy needed to tow a ship of 12,000 tons a distance of 6000 sea miles at 15 knots is contained in 22 ounces of radium. The *Saxon* probably burns 5000 or 6000 tons of coal on a voyage of approximately the same length. "Now we know," said Professor Darwin, "that the earth contains radio-active materials, and it is safe to assume that it forms in some degree a sample of the materials of the solar system; hence it is almost certain that the sun is radio-active also." He added that this branch of science is only as yet in its infancy; but we already see how unsafe it is to dogmatize on the potentialities of matter.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 706.)

Business on the Stock Exchange continues to expand; and though there has been some profit-taking in view of the settlement, yet a good under-tone has prevailed. The advance in the Bank-rate had but a temporary effect upon stocks—most of the speculative securities having now recovered their declines. Many investors have been shifting their securities, selling those upon which they have good profits, and buying others which are likely to improve in value, and which have been overlooked in the recent rise. All this makes for more business, and creates a favourable impression as regards the future. The rise in the Bank-rate to 3 per cent. naturally affected Consols and other gilt-edged securities, and caused stiffer rates for discount; but money rates have not altered—day-to-day advances being easily obtainable at 1 per cent. and under. Gas securities, although less active, showed a firm tendency; and some twelve stocks are higher on the week. The only adverse movement was in Gaslight ordinary, in which a good business was recorded. Most of the dealings were done between 100 and 100¾; but the price subsequently dropped ½, and sales were recorded at 99⅝. Business was done in the 3 per cent. debentures at 89; the stock remaining steady. There was not much doing in Commercials; but the ordinary changed hands at 117, and the debentures at 89. South Metropolitan stocks met with some inquiry; the ordinary changing hands between 132½ and 133½, while the debentures were bought at 89¾. In the Suburban and Provincial group, British shares are 1 up, at 43-44, dealings being recorded at 43⅜. Special business was done in Brighton ordinary at 228; while there were also some dealings in South Suburban ordinary at 124, Bromley debentures at 94½, and Lea Bridge at 128½. Firmness likewise characterized the Continental group; Continental Union advancing 1 to 115-18, business being recorded at 117½. Imperial Continental also advanced 1 to 216-18; stock changing hands at 216 and 217. Tuscan rose ¼ to 9¾-10¼. European were also supported; the shares advancing to 22½ to 23⅜, with dealings at 23¼. The shares of undertakings in the remoter world were likewise firm. Buenos Ayres again improved, and are now quoted at 12½ to 13, dealings being recorded at 12⅝; River Plate also advancing ¼, to 13 to 13½, with business at 13 3/16. All the issues of the Cape Town improved; the preference shares ¼, to 10¼-10¾; the 6 per cent. mortgage 1, to 53-55; and the debentures 1, to 102-104. But there were no official markings of business. Primitiva debentures were quoted 98½; and the preference 5½.

ELECTRIC LIGHTING MEMORANDA.

Power Companies and Economic and Financial Success—Doubtful Prospects—The Lighting of School-Rooms—Variable Illumination—The Deterioration of Incandescent Lamps—"Absurd" Calculations, or Absurd Reticence?

It has often been urged that before Parliament invests further electricity power companies with statutory rights, there should be concrete experience as to the measure of success likely to be realized by these mammoth concerns from economic and financial points of view. The anticipation that the concentration of generating plant and the production on a large scale will fine down works' costs to the narrowest possible limits, and deliver electricity to the transmitting cables at the lowest attainable cost, is only one side of the question. The heavy capital expenditure on the distributing works, accompanied by an inadequate demand from those whom it had been hoped to net as customers, may swallow up all the advantage gained at the producing end. It seems, therefore, only reasonable for Parliament to now take into account the question of the protection of the public, as well as the aspirations of company promoters and the problematical advantage to industry, before granting additional extensive powers of this particular kind; for the effect of such schemes being launched under the cloak of parliamentary ratification is to give the public an altogether false conviction as to the security as an investment of the enterprise. At the moment, the experience in respect of financial success, and of economic and beneficial success in connection with industry, save maybe in one or two specially choice districts, is that the Companies have not proved themselves of general public advantage; and therefore the investing public (the difficulty is to get the matter brought before them) should show a little more discretion in parting with their money when plausibly drawn prospectuses reach them from such sources. The commencement of the publication of a description of the Yorkshire Electric Power Company's generating and distributing works has been made the occasion for an editorial in the "Electrician" on the general subject; and throughout it the writer is palpably embarrassed by the not over-brilliant conditions that crowd upon such undertakings. It is admitted that the progress of the majority of the power companies has been lamentably slow, and that there is a tardiness about the operations of some of them which is to be regretted. But the "possibilities!" Of course, most things possess "immense possibilities;" and our friendly contemporary finds that these power companies come within the bountifulness of human hope, for it is written that "a good number of the companies which have embarked in this business—even some of those which have been bad starters—still have immense possibilities before them." There is a little redundancy in the last half-dozen words. But that may pass; the meaning is clear.

For the power companies, it will be very gratifying to them to learn from the "Electrician" that there is abundant evidence of cordial reciprocity between consumer and supplier, and in many instances the prospective consumer is as anxious to take energy as the supplier is to supply. The Yorkshire Power Company particularly will take heart, as although their "progress may be difficult, and the early results disappointing as far as the shareholders are concerned, yet success must be achieved eventually." There is great safety in the word "eventually," which has application to any time (say) from next Christmas down into the boundless ages yet to come. It, however, rather spoils the polish put on to the position when the writer in our contemporary concludes by saying that cheap energy is a commodity that will always find a ready sale; the only difficulty being to convince prospective consumers that it is really cheaper than what they have already. Incidentally, we may express gladness at finding that, in this matter of power, the "Electrician" is in harmony with a point we have insisted upon in connection with the discussion as to the costs of public lighting. It is no use adopting, as so many electricians have adopted, abstruse calculations of cost comparison in treating with consumers technically unqualified to comprehend them. The writer plainly warns electricians, in dealing with power supply, against the practice of discussing power factors and diversity factors; the only point appealing to such consumers being the "actual cost per horse power per annum." Our contemporary would do well to carry the caution a little farther. If consumers cannot grasp the principles of the maximum-demand system of payment, of power factors and diversity factors, they cannot grasp the meaning of costs ironed out to a repulsive looking row of figures with a decimal point interposed, and referring to the "candle-power-hour." In the correction of the ways of electricians too, our contemporary might pray their readers to renounce the practice of comparing the various types of arc lamps with the ordinary incandescent gas-burner; seeing that it would be equally sensible for the gas engineer to send out comparisons of the cost per candle-power-hour of high-pressure incandescent gas-lamps in comparison with incandescent electric lamps. But to hark-back to the subject in hand, there are indications that, if these power companies are to be really successful, in districts where the visions of a big industrial demand have melted away, it can only be by a change of attitude on the part of local authorities, and the taking of current in bulk in preference to prosecuting the development of their own generating-stations. But the very existence of these generating-stations is the greatest obstacle to such (for provincial power companies) a happy event. For small towns, without an electricity company, if the local authority are determined to have an electricity supply, then we agree that, in the interests of the ratepayers, it is better—with an electric power company at hand—to obtain from them such electricity as is required in bulk rather than sink a large amount of capital (with its considerable annual charges) in a generating-station. The smaller the capital expenditure, the smaller the victimizing of the ratepayer; and this is a point we have never yet seen satisfactorily disposed of by those who—probably not for disinterested motives—contend for every municipal authority being the producer as well as the purveyor.

Dr. J. J. C. Müller, of Bremen, has been experimenting on the lighting of school-rooms, with various types of electric lamps; and the results are valuable, inasmuch as they show a variability of the distribution of illumination which cannot be deemed satisfactory in the lighting of any room whether used for scholastic or other purposes. It may be taken that the lamps were treated with the utmost consideration by the good Doctor. They were no doubt new lamps; the ceilings and walls of the rooms were freshly whitewashed; and in some of the experiments the rooms were stripped of all furniture and fittings. One of the rooms so treated was 25 ft. 3 in. by 23 ft. by 13 ft. 3 in. high. Four groups of six 22-candle power "Tantalum" lamps were employed; and, to make the nursing quite complete, they were arranged under a reflector or mirror. The benches ordinarily used in the room are 2 ft. 10 in. high. With the lamps 6 ft. 6 in. above that height, the illumination varied from 5·5 to 3·4 candle-feet; with the lamps 8 ft. 3 in. above, the illumination varied from 4·8 to 3·5 candle-feet; and with the lamps close to the ceiling, the illumination varied from 4·2 to 2·9 candle-feet. The amount of energy consumed by the lamps was about 1080 watts—say, rather more than a unit per hour. With several rows of benches (2 ft. 4 in. high) in the room, three scholars at each, and the lights 8 ft. 10 in. above the desk level, the illumination only ranged from 3·8 to 2·7 candle-feet—one spot having only 2·3 candle-feet. It is suggested that probably this was in shadow. Dr. Müller, however, considers this a sufficiently bright and uniform light for a room; seeing that it exceeded the rule he had adopted, that the strength of illumination at all points of the room should be at least 2·04 candle-feet. What the illumination would be like when the walls become dirty and the lamps get on to the down-grade would hardly meet with the approval of the students, much less satisfy the Doctor's rule. In another room, 34 ft. by 24 ft. 3 in., freshly whitewashed, two school arc lamps for indirect lighting were employed; each requiring 10·4 amperes of current and absorbing

1144 watts. Metallic reflectors threw the light direct on to the ceiling; and in the empty room at the bench-level the values obtained ranged from 4·7 to 2·5 candle-feet. Filled with benches, and with three men to each, the values were only 2·3 to 1·6 candle-feet. Incandescent electric lamps, giving an average illumination with the room empty at working level of 4·1 candle-feet, gave only an average light equal to 2·85 candle-feet when the room was occupied with benches and scholars. A single 10·4 ampere indirect arc lamp in a small room gave a light ranging as low as 1·7 to 1·1 candle-feet. The Doctor favours indirect lighting both on account of the eyes of the students and the fact that shadows are almost entirely absent.

For the lighting of such rooms as Doctor Müller experimented in, we question, accepting for the moment the sufficiency of the Doctor's rule of 2·04 candle-feet illumination at "all points" of the room, whether the provision of light he made allowed that margin for depreciation in value that time must bring—the lower values running so close to, and even below, the rule. In the room, lighted by the 24 "Tantalum" lamps, assuming the nominal illuminating candle power to be that actually obtained, the total light given was 528 candles, with the consumption of rather more than a unit of electricity, or about 2 watts per candle, which is, admittedly, a considerable improvement on the ordinary carbon-filament incandescent lamp. But ten ordinary incandescent gas-burners, consuming altogether only 30 to 35 cubic feet of gas an hour, would have supplied the same illumination, with a less variation in the distribution of the light than that shown by the Doctor's experiments. Besides this, there are the inverted and other forms of gas-lamps suitable for school-room lighting that will give from (say) 25 to 30 candles per cubic foot of gas consumed; and these, while showing still greater economy, would have a special applicability to rooms of the size of those named in these experiments.

Talking of the scant margin of illumination that is mentioned by Dr. Müller, reminds us that quite a feature of modern electric lighting practice for interiors is that a diminution of light per given space is being advocated to aid in counterbalancing the higher cost of incandescent electric lighting as compared with incandescent gas lighting with common burners. But, at the same time, no allowance is made for the illuminating power loss of electric lamps that tests show to be common, and which the makers seem to be unable to avoid. In this respect, the "Tantalum" lamps, notwithstanding the remarkable distortions of the filaments after a comparatively few hours' use, appear (so far as we have been able to judge) to be better than ordinary carbon-filament incandescent lamps. These are certainly in bad repute among electricians. Only at the last meeting of the Municipal Electrical Association, it was reported that "investigations made by members of the Council in their respective towns show that the average efficiency of the lamps in use is considerably lower than it ought to be, with the result that consumers are often called upon to pay heavier accounts, and an unfair and unnecessary advantage is given to the competition of gas and other systems of illumination." The Council have appointed a Committee to investigate and report with a view to securing uniformity of practice among lamp manufacturers, a more accurate and reliable grading of lamps, and the discontinuance of the use on municipal supply systems of lamps which are offered at low prices, but which do not give the amount of light marked thereon, and are exceedingly wasteful of electrical energy. This is an acknowledgment, by professional men, of the truth of a frequently denied assertion. Though the efficiency and uniformity in illuminating power of the "Tantalum" lamps may be superior to ordinary incandescent electric lamps, the initial price per lamp—omitting the double expense in use, as compared with incandescent gas-burners—will alone act greatly against their popularity. In the case of the cheaper incandescent gas-burner, any depreciation in the illuminating power can be quickly remedied by the simple removal of the burner and mantle, and blowing through the former. That is an advantage, in addition to economy in initial and in working cost, to the credit of the incandescent gas-burner.

We find that it was on Aug. 22 that we gave "Meteor" of the "Electrical Times" a little information, at his request, that it must be assumed he very much stood in need of. But, after thinking over the matter till well into September, he returns our kindly meant compliance with his request by telling his readers that we have been "touched on the raw by his comments," and by exhibiting to them that even one of "Meteor's" genial disposition is subjected to turns of extreme ungraciousness. He informs his readers that he is not "disposed to take as gospel our contemporary's 'well-established' facts about the candle power of 'C' incandescent burners," which is a positive declaration that he knows nothing at all about the matter. Before he continues to talk round about the question, it is advisable for him to clear his mind from all doubt on the subject of the illuminating power of incandescent gas-burners, their consumption, and so forth; and then he will be able to point out clearly where, if at all, the calculations that are published by the gas industry are wrong. It is the fashion for the electrical periodicals to write of these calculations as "absurd," and to say that "comment on such statements as these is, of course, unnecessary." Pretty and effeminate, but not convincing. As to producing figures to establish the "absurdity," that is a little piece of pleasure that they, with unwavering strictness, deny us.

THE CHEMICAL ENGINEER.

It must be patent to all observing persons identified with industrial and engineering work that, in the development of the industries in all countries in recent years, engineering has been companioned by chemistry. In the last United States census report in dealing with the chemical industries, it was stated that modern industrial chemistry has developed mainly along engineering lines; and, by the conversion of terms, the like may be said of other industries—even of those in which engineering has a pre-eminent place—that in their development chemistry has played an important part. The two, chemistry and engineering, are now so conjoined (and particularly is this the case in the gas industry) that the fact must not be lost sight of in the training, or in the provision for technical acqusition, of our engineers in the future. The field of chemical engineering is now, in fact, a broad one; and in that field the gas industry is now among the most important. Consider the matter from the raw materials—coal and oil—to the production of the gas; consider the means of utilization and the effects in lighting, cooking and heating, and motive power; and consider also the most profitable utilization of the residual products. It is seen that, from manufacture to the final utilization of the product, the gas engineer who can personally conduct the technical analysis of the raw materials—both solid and liquid—of illuminating and fuel gases, products of combustion, &c., has it within his power to better serve his undertaking and the consumers (no matter the application of the gas) than the gas engineer who is incapable of such work. All gas undertakings cannot afford specialists for every branch of their work; and even if they could, the qualified engineer with the chemical knowledge would still be the better man for his position than the equally qualified engineer without the knowledge.

From the University of Wisconsin, we have received a pamphlet which shows in the first place two things—the one is how in America there has, during the past few years, been a marked and steadily increasing demand for chemical engineers; and the second is that, recognizing this, the engineering college has arranged accordingly. The fall of this year witnesses at that college the commencement of a course of chemical engineering; this section being under the direction of Professor C. F. Burgess. We have read through the information given in the pamphlet; and it will be of interest to those engaged in this line of work in this country if we indicate by quoting from it the objects in view. It is the purpose of the chemical engineering course to thoroughly train students in the fundamental principles of both chemistry and engineering, and to give such other subjects as will so far as possible contribute toward a liberal education. Specialization along narrow lines is not provided for particularly in the undergraduate work, since it has been shown by experience that the technique of any line of industrial work is most profitably acquired by a student after he leaves college. A certain amount of attention is, however, given to purely technical subjects, for the especial purpose of setting forth the correlation of chemistry and engineering, emphasizing the dependence of practice upon laws and principles rather than upon empirical rules, and in giving training in the application of engineering and scientific principles to investigation and original research.

It is held that a chemical engineer should have as thorough a grounding in the principles of engineering as a mechanical, civil or electrical engineer should have; and the course outlined in the pamphlet is arranged to accord with this belief. In addition to this, he should have an equally thorough founding in the principles of chemistry. To provide satisfactorily for such training within four years, seems to the projectors of the scheme impossible; and therefore a five-year course is offered. It is not practicable, for the present at least, to make the fifth year obligatory, and the work has been so arranged that a student who finds it is impossible to remain more than four years, will have had, at the end of that period, a course of study which has carried out, so far as four years will permit, the idea of a combined chemical and engineering course. If a student so desires, he may, at the end of the four years, receive the degree of Bachelor of Science in this course. If, however, he completes the fifth year, he will receive the degree of Chemical Engineer. While the fifth year is made optional, it is strongly recommended for men who propose to enter chemical engineering work, as in many respects it is the most important year of the course. It is in this year that specialization is provided for; and in it the student will be put upon his own resources, and given training in investigation work which develops those most important attributes of a successful engineer—resourcefulness, ingenuity, and ability to apply general knowledge and scientific principles to specific problems. A thesis embodying the results of a laboratory investigation on some chemical technology problem constitutes one of the requirements for the fifth year; and in such cases where the B.Sc. degree is taken at the end of the fourth year, a similar thesis will be required.

The outline of study which has been adopted for this chemical engineering course is the result of an adaptation of local facilities to meet as far as possible the ideas of prominent chemical engineers and others deemed competent to judge the requirements of a satisfactory course. There is, naturally, a wide divergence of opinion among various authorities, as shown by the marked variation of the chemical engineering courses given by different

technical schools. It is held that a safe course will be pursued if the training be equally directed towards turning out a good engineer and a good chemist. The course which has been adopted, therefore, apportions a student's time so that, after making allowances for languages, composition, mathematics and physics, it is equally divided between what might be called engineering subjects, and those relating to chemistry.

This sketch suffices to show the comprehensive nature of the scheme by which the University of Wisconsin proposes to meet the training requisite for the chemical engineer, the demand for whom the changes in our manufactures have brought about. The course is a complete one; it has our commendation; and it is hoped that in due course a satisfactory report will be received as to the success of the enterprise of the University in so acting upon their perception of the requirements of the times.

THE TRADES UNION CONGRESS.

Conciliation and Workmen's Compensation.

LAST week witnessed the opening and close of the thirty-eighth annual Trades Union Congress, which was held at Hanley. The gathering was one of the largest held; there being present more than 450 delegates. This was owing, to some extent at least, to a resumption of their allegiance (after an absence from several years' congresses) by the Amalgamated Society of Engineers and the Durham Miners' Union. The President for the year was Mr. James Sexton, of the Liverpool Dockers; and eight Labour Members of Parliament were present. The visitors included the Countess of Warwick, Sir John Gorst, and Mr. John Burnett, of the Labour Department of the Board of Trade. A hearty welcome was offered by the Mayor (Alderman M. Huntbach), who, while admitting that labour was the main source of profit to the world, remarked that, if it was to be on top, there was possible danger. He, however, expressed confidence, which may not be universally shared, that the intelligent members of the congress would know how far to go, and where to stop.

The first item of business was the presentation of the report of the Parliamentary Committee, who naturally had a good deal to say on the present occasion. Considerable space was devoted to the Trades Unions and Trades Disputes Bill, which met with such rough treatment at the hands of the Standing Committee on Law; and after going through the various parliamentary topics in which the congress might be supposed to be interested, they concluded with the statement that much work had been done which was not seen and could not be recorded, but which was very effective. They added that the time was ripe for great efforts. On every side they found capital arrayed against the workers, organized as it had never been before, and supported to-day by the immense influence of an unjust law. They were pleased to observe that the growing menace to their liberties had had the effect of drawing closer together their leaders and all sections of workers. And this, if you please, followed closely upon a statement that, in accordance with a resolution passed last year in favour of launching a daily Labour paper, the Committee issued a circular to Trades Unions asking how much money they were prepared to invest; but that the replies received did not warrant the Committee in proceeding with the scheme. For a remedy for the state of affairs of which they complained, therefore, they had to fall back upon the well-worn idea of an increase in the number of Labour Members of Parliament. While the report was being discussed, a delegate succeeded in putting forward a modest proposal "that the Parliamentary Committee request the Home Secretary to vacate office, and that the President of the Congress take his place;" but this was unkindly ruled out of order.

The next item was the Presidential address, which dealt almost solely with the political aspect of the labour question; and afterwards a resolution was passed that, "in order to provide larger means of carrying out social reforms, public administrative bodies should be empowered to issue their own credit notes, thereby avoiding the heavy interest charged for the use of borrowed money, and instructing the Parliamentary Committee to draft a Bill embodying this principle." Another Bill which the Labour group in Parliament were requested to introduce, was one having for its object the nationalizing of all railroads, canals, mines, and minerals in the United Kingdom;" and then the question of industrial conciliation and arbitration was brought forward by Mr. Ben Tillett. His resolution, which was a somewhat long one, was in the following terms: "This Congress regards the progressive growth of mediation and arbitration in industrial disputes as satisfactory, and tending to national efficiency and prosperity. In view of the increase in numbers of Conciliation Boards, and the more active participation of the State (under the Conciliation Act) in trade disputes, this Congress instructs the Parliamentary Committee to further by every practical means the principle of conciliation and arbitration. In order to protect Trade Unionists and Union funds from the maladministration of 'contract' law, we further instruct the Parliamentary Committee to draft a Bill, for immediate presentation to Parliament, which shall embody the following conditions: (1) A basis of contract law protecting inviolate all funds of Unions. (2) The formation of Industrial Boards of Conciliation and Arbitration in all large industrial centres. Such committees to undertake on request of parties to a dispute investigation as to data and facts, to determine settlements and awards. (3) Courts to be constituted by an equal number of workmen and employers' representatives, the former to be selected under auspices of the Parliamentary Committee from affiliated membership of the congress. Each umpire and chairman to be appointed by the Labour Department of the State, where not mutually agreed. (4) There shall be two sections, defining—(*a*) voluntary conciliation and arbitration, (*b*) compulsory conciliation and arbitration—option to be left to Unions to register under either section." But, on a vote being taken, the resolution was lost; though we are pleased to note in the course of the discussion upon it some very evident signs of the declining popularity of strikes. Several of the members rose to advocate the policy of conciliation; the representative of the Swansea dockers giving voice to the sensible opinion that strikes and lock-outs were disasters, and that any organization which was ready to resort to the brutal arbitrament of a strike without conciliation "was a bit of a brute itself." The only wonder is that it should have taken some men so long to see matters in this light, and that others do not appear to do so even yet.

On the subject of workmen's compensation, a resolution was introduced embodying the provisions that should be inserted in any amending Act. These (which were much the same as were submitted last year) were as follows: "(1) The inclusion of all workmen, hereinafter defined, who meet with an accident or incident dangerous to the personal health of the workman arising out of, or in the course of, his employment. (2) Payment of not less than 50 per cent. of what the workman would have earned provided he had been employed full time. (3) Payment to date from the day of the accident. (4) Payment to a minor to be based upon the ultimate loss which such person, becoming an adult, sustains as a result of said injury. (5) Wilful and serious misconduct to be restricted to acts of an aggravated character. (6) Compensation to be payable to dependents, and dependents to mean relatives or guardians who have either maintained in the past or are being maintained by the injured person. (7) That workmen, equally with employers, shall have power to apply for commutation by lump sum. (8) That the weekly payment to a workman who has met with permanent injury cannot be terminated except by commutation. Commutation to be not less than 75 per cent. of the actuarial value of the workman's weekly payments. (9) And the onus be thrown upon the employer to prove that the particular workman fully understood at the time the terms of the settlement, and was cognizant of the rights which he possessed under the Act. (10) Where compensation has been paid to an injured person, the employer is to be compelled under a penalty to register an agreement in the County Court. The expression "workman" includes every person who has entered into, or works, whether by way of manual labour or otherwise, under a contract of service or apprenticeship, with an employer in the United Kingdom or on board a British ship, whether the contract is expressed or implied, or is oral, or in writing. The expression minor includes every person who has not attained the highest grade of the employment in which he may be employed at the time of the accident." Eventually the matter was referred back for further consideration by the General Purposes Committee; the opinion being expressed that provision should be made for compulsory State insurance against all accidents and diseases of occupation, and that the clause of the Act dealing with serious and wilful misconduct should be abolished. Later in the congress, the resolution was again brought forward, with the clause relating to wilful and serious misconduct deleted, and a new one added providing for "some system of compulsory insurance which would secure that employers should have paid the necessary funds to compensate for all accidents or injury or for diseases arising out of, or incidental to, the nature of any employment." The latter, however, did not altogether commend itself to the delegates; and on a vote the word "State" was added. In this form the resolution was then agreed to.

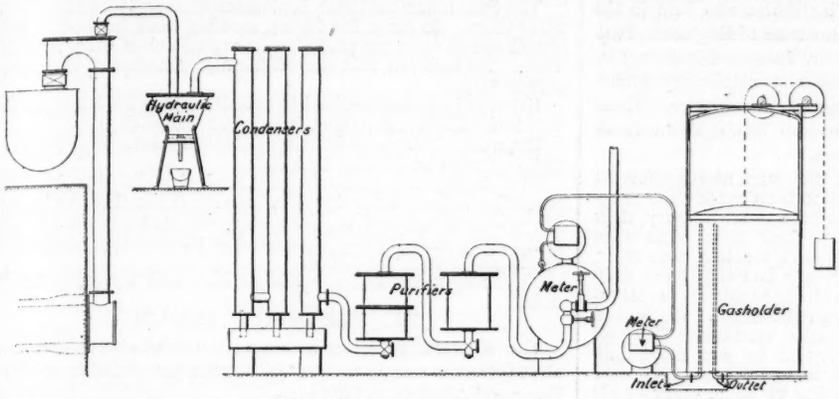
Among the many other resolutions passed were those in favour of an eight-hour day and old-age pensions, and condemning the action of the Solicitor-General in supporting amendments to the Trades Unions and Trade Disputes Bill in Grand Committee on Law. The congress will meet next year in Liverpool.

Chartered Institute of Secretaries.

A notification has just been issued to the effect that no persons will, after Nov. 4 next, be admitted as Fellows of the Chartered Institute of Secretaries without passing a qualifying examination. Persons whose chief occupation is secretarial, and who have had eight years' experience in the offices of joint-stock companies or other public bodies, the last three of which have been as secretary, are eligible as fellows. Power to grant dispensation is reserved to the Council in very exceptional cases. The membership of the Institute is now 2635; and the Council consists of secretaries of companies and public bodies representing the principal commercial interests in the United Kingdom. As the Institute takes a keen interest in legal and commercial matters, and represents professional secretaries as a body, it is hoped that those who are qualified by experience and long service will not miss the present opportunity of joining its ranks.

THE EXPERIMENTAL GAS-MAKING PLANT AT MARSEILLES.

THE current issue of "Le Constructeur d'Usines à Gaz"—a kind of monthly supplement to our French contemporary, "Le Gaz"—contains an illustration (which we reproduce on a small scale) of the experimental gas-making installation at Marseilles, arranged by Messrs. J. Verdier and P. Teulon. It consists of a retort in one of the settings in use (which may be isolated from the ordinary works hydraulic main), and connected through a small hydraulic main to a system of condensers, purifiers, and station meter. The station meter is surmounted by a small test-meter, taking off automatically from one-fiftieth to one-thirtieth of the gas produced. This gas is sent into a holder of a suitable capacity—about 50 cubic feet is amply sufficient. The remainder of the gas may either be blown off into the air or else sent forward into the ordinary town supply main. The sections of the various appliances, and of the connecting pipes, are such that without the use of any exhauster, and maintaining the pressure at zero at the outlet of the meter, the pressure in the retort does not exceed 2 cm. (8-10ths of an inch). The operations are therefore carried out under excellent conditions, and in all points are comparable with the conditions of ordinary working, so that it is easy by this arrangement to make a careful study of the gas produced by the ordinary gas manufacturing plant. The installation is employed day by day at the Marseilles Gas-Works for the testing of various coals; and it is useful at other times for various investigations.



NEW SOURCES OF THORIUM AND CERIUM.

A NEW species of mineral, termed "Naëgite," is described by Tsunashiro Wada in his book "Minerals of Japan," Tokyo, 1904. It is found with fergusonite in the alluvial tin washings at Naëgi, near Takayama, in the Province of Mino, as green to brown spheroidal aggregates, with indistinct crystals on the surface. The crystals are tabular or prismatic in habit, and appear to be tetragonal. Under the microscope, the mineral is grass green and transparent, and is sometimes optically birefringent, but more often isotropic. Its hardness is 7½, and its specific gravity 4·09. It is strongly radio-active. The following analysis by T. Tamura shows it to be mainly a silicate of uranium and thorium; and from its crystalline form it is considered to be isomorphous with zircon and thorite. Besides the principal components uranium and thorium, it contains other rare metals tantalum, niobium, and cerium.

	Per Cent.
Silica ($Si O_2$)	34·89
Uranium oxide ($U O_2$)	28·27
Thorium oxide ($Th O_2$)	16·50
Tantalum oxide ($Ta_2 O_5$)	7·00
Niobium oxide ($Nb_2 O_5$)	4·10
Cerium oxide ($Ce O_2$)	1·59
Ferric oxide ($Fe_2 O_3$)	1·60
Calcium oxide (Ca O)	1·71
Magnesium oxide (Mg O)	0·57
Water	3·12
	99·35

Beckelite is the name of a new mineral found in the Mariupol district on the Sea of Azov, Russia. Józef Moroxewicz describes it as an accessory constituent of a dyke-rock composed of nephelite, albite, aëgirite, and magnetite in association with other minerals. The wax-yellow grains and octahedral or rhombic dodecahedral crystals, which measure up to 0·5 c.m. across, resemble pyrochlore in general appearance and physical characters, but have a cubic instead of an octahedral cleavage. Its hardness is 5, its specific gravity 4·15; and it is readily decomposed by acids, with separation of silica. Chemically it is quite distinct from pyrochlore, containing no titanium, niobium, or fluorine, but a large percentage of cerium, lanthanum, and didymium. The formula calculated from the subjoined analysis is $Ca_3 (Ce, La, Di, Y)_4 (Si, Zr)_3 O_{15}$, which written as $Ca_3 R_2 Si_3 O_{12}$, $R_2 O_3$, shows a relation to garnet, with rare earths in place of alumina, and an analogy to calcium alumino-silicate.

	Per Cent.
Silica ($Si O_2$)	17·13
Alumina ($Al_2 O_3$)	0·30
Ferric oxide ($Fe_2 O_3$)	trace
Zirconium oxide ($Zr O_2$)	2·50
Yttrium oxide ($Y_2 O_3$) / Erbium oxide ($Er_2 O_3$)	2·80
Cerium oxide ($Ce_2 O_3$)	28·10
Lanthanum oxide ($La_2 O_3$)	13·60
Didymium oxide ($Di_2 O_3$)	18·00
Manganese oxide ($Mn_2 O_3$)	0·07
Calcium oxide (Ca O)	15·46
Magnesium oxide (Mg O)	trace
Potassium oxide ($K_2 O$)	0·39
Sodium oxide ($Na_2 O$)	0·78
Loss on ignition	0·99
	100·13

PERSONAL.

The many friends of Mr. WILLIAM KING will be interested to learn that he and Mrs. King have now almost concluded the voyage round the world, for the purpose of which they left England last October. They have visited South Africa, Australia, New Zealand, China, Japan, the United States of America, and, after crossing the Rockies, arrived in Montreal on the 26th ult, They left that port on the 1st inst. in the *Victorian;* but the vessel had the misfortune to get ashore in the River St. Lawrence. A cablegram, however, assures us of the travellers' safety, and states that it was their intention to leave Quebec in the *Bavaria*, which is due to reach Liverpool on the 16th inst. Mr. and Mrs. King are in very good health, and have greatly enjoyed their travels. This mishap on the last stage is the only unfortunate incident that they have encountered.

OBITUARY.

Mr. ANDREW DEWAR, who was for many years in the employ of the Edinburgh and Leith Gas Company, died at Peebles on Friday, the 1st inst. Mr. Dewar was Statutory Clerk of the Company; and on the transfer, in 1888, he was appointed Superintendent Surveyor by the Gas Commissioners. A few months afterwards, however, finding the situation not to his liking, he retired, and claimed his statutory pension of £250 a year.

There passed away on the 6th inst., Mr. THOMAS SYMONDS HOWELL, M.R.C.S., aged 83, for over forty years Chairman of the Wandsworth and Putney Gas Company. His father, Dr. James Howell, had been Chairman before him, having founded the Company. The deceased gentleman was devoted to the management of the Company, which attained an abnormal success under his administration. The Company, in which he was the largest shareholder, was a personal hobby; but he early saw the advantage of a Technical Director, and was happy in attracting to his assistance in 1862 the late Mr. Robert Jones, M.Inst.C.E., whose pupil, Mr. H. S. Freeman, M.Inst.C.E., was Engineer from 1869 to about 1900—following Mr. H. E. Jones, who was in that position for seven years before. Both the latter gentlemen are now Directors—Mr. Jones having been Chairman for some time now—and were present with many of the staff and workmen at the old Chairman's funeral. His place on the Board has been filled up by his second son James; his eldest son Arthur being already a Director.

The death occurred on Monday of last week, after a long illness, of Mr. JOHN DAVIES, who was Manager of the Nantwich Gas-Works until the time of the transfer of the undertaking from the Company to the Local Authority last year. Deceased, who was 68 years of age, was a native of Flint, and was until 1873 Engineer and Manager to the Ruthin Gas Company. In that year he went to Nantwich, the gas-works at which town were then of small value; and after years of hard work, he so far succeeded in increasing the business that the shareholders were able to receive dividends. Three times during his management the works were re-built; and towards the end of his career he saw completed a scheme of extensive alterations and additions. In 1873 the make per annum was not more than 8 million feet; but by 1902 it had been increased to 34 millions—the price having in the meantime been reduced from 5s. 9d. to about 3s. 9d. per 1000 cubic feet. Mr. Davies, who is survived by his wife and two sons and daughters, was a member of the Institution of Gas Engineers and of the Midland Association of Gas Managers.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Inaugural Meeting in Cardiff.

The First General Meeting of this Institution was held in the Lecture Theatre of the South Wales Institute of Engineers, Park Place, Cardiff, on Wednesday last. Mr. THOMAS CANNING, J.P., of Newport, presided; and there was a very satisfactory attendance from all parts of South Wales and Monmouthshire. Those present also included Mr. Charles Wood, of Bradford, the President of the Institution of Gas Engineers.

The PRESIDENT, at the outset, said they were meeting for the first time in a district which had hitherto been outside the range of Associations of this kind. In this part of the country, their means of communication were not so good as in some other places; and consequently opportunities of meeting were rarer. It appeared to him, however, that the very fact that these difficulties did exist provided a real and a strong reason for the establishment of a vigorous Association in their midst. He looked forward to having a really representative attendance from all parts of Wales and Monmouthshire; and he was more than gratified in this respect. He would have been very pleased indeed to have seen the chair occupied by some other of his friends—two especially, either of whom he would have liked to have seen there. He referred first of all to one who was about the oldest—the very oldest, probably—of all engineers in Wales, Mr. Thornton Andrews, of Swansea, who held a high position not only in the engineering world but also in social circles in South Wales. The other was their good friend Mr. Henry Morley, of Cardiff. But—failing these two gentlemen—it had been necessary that some one else should step into the breach; and so he (the speaker) had done it. He was glad to say they had with them that day, the President of the Institution of Gas Engineers, Mr. Charles Wood, who had taken the trouble to come all the way from Bradford. With respect to the utility of an Institution of the kind they had projected for Wales and Monmouthshire, it was necessary, as this was their first meeting, to say something with the object of doing away with some of the prejudice and foolish notions that prevailed in certain quarters. To do this, it was only necessary to refer to what other Institutions of a similar kind had done. The very hall in which they were then meeting had been put up by the South Wales Institute of Mining and Mechanical Engineers—a body which had, in a quiet way, done more for the progress of mining and mechanical engineering than institutions that were more spoken of by the general public. The members of the Institute had derived enormous benefit from their meetings there; and was it not to be expected that the same would be the experience of the gas engineers? But he wanted to go back some 25 years, when there was still some hesitation about the conversion of iron-works into steel-works, when these and many other processes had to be carried out at enormous expense. The Mining Institute had much to do with bringing these problems to a satisfactory solution in the end; and he held this fact up to those now present as an example of what they might be able to do if they met together to discuss questions of a common and vital interest. It was their business to protect their trade; and they could only do this by meeting together. Institutions of a similar kind in other places had tended to the promotion of the gas industry, and the welfare of the members who associated themselves with the meetings. He welcomed them all that day. He desired for them the very greatest prosperity, and he wished the Institution "God speed" on its career.

THE RULES SETTLED.

At this point the rules of the Institution—as prepared by the Council—were submitted and read by Mr. Canning *seriatim*. Rule 2, which provided that those eligible for membership should consist of "engineers, managers, and assistant managers of gas-works in the service of gas companies or local authorities," evoked some discussion.

Mr. F. C. WHITE (Treharris) moved to omit the words "in the service of gas companies or local authorities," with the idea of throwing the Institution open to those in the employ of private concerns.

There was no seconder, so the proposal fell through.

Rule 8 had reference to the date of holding the meetings.

The PRESIDENT, in submitting this, asked the meeting to consider the question of whether the first Wednesday in March was a suitable date for the Spring meeting, or whether it would not be better to hold it a month or two later.

Mr. C. WHITE (Blaenavon) suggested that, as many had to come a long way, possibly it might be better to hold only one meeting every year, and let it last two days.

The PRESIDENT said he fancied that, for the majority, a two-day meeting would be inconvenient. Personally, he thought it would be better to hold two meetings in the year.

Mr. WHITE urged that there was just the point that some had to come a long way to the meeting.

Mr. T. ACLAND (Llanelly) moved that the Spring meeting be held in May.

Mr. J. H. CANNING (Newport) seconded.

Mr. WHITE asked what time in May.

The PRESIDENT said that September seemed to be suitable to all of them. So far as the Spring meeting went, he thought they would not do wrong to profit by the experience of other Associations. He believed that the Midland Association, at all events, met in May.

Eventually, it was resolved to substitute May for March, as the month for the first meeting of the Institution each year.

Regarding Rule 9, which stated that questions of a personal nature should be decided by ballot,

The PRESIDENT jocularly remarked that he thought there would be little need for this rule, because if members had quarrels of a personal nature, there were other places in which they could go to settle them. "There will be no such thing as duelling or pistols for two," he added.

The rules were then adopted *en bloc*, with the amendments noted.

THE PRESIDENTIAL ADDRESS.

The PRESIDENT having announced, amidst cheers, that they already had a membership of 47, at once proceeded to read his Inaugural Address, as follows:—

Gentlemen,—It is a matter of congratulation that at last an Institute of Engineers and Managers of gas-works has been formed, under auspices that are promising, for the whole of Wales and Monmouthshire. I have to express to you my deep feeling of gratitude for the signal honour you have conferred upon me in electing me unanimously as your first President. I will not say, as is the custom too frequently, that I feel myself unworthy of that honour; because it is probable this may be so obvious as to render it wholly unnecessary for me to give expression to it. But that, instead of diminishing my gratitude, only renders it more fervent.

The Wales and Monmouthshire District Institution of Gas Engineers and Managers—which stands forth to-day for the first time in the full exercise of its visible, tangible existence—has one feature to which I refer with pride; and it is, that it represents a Nation, which Wales certainly is. It is, therefore, fitting that our first meeting should be held in this progressive town of Cardiff, the chief town in Wales. We are not all Welshmen; but there are none of us who have dwelt among the kindly people of Wales for any considerable time who have not in learning to know them, learned also to admire them and their beautiful country.

The industry we represent is a great and flourishing industry. Several of the great industries around us in the Kingdom during the past twenty years have either succumbed altogether or have become so attenuated that their disappearance may momentarily occur. Our industry has been threatened more than any other industry and more than any other industry has it been opposed, and an attempt made to shake the foundation of public confidence in its progress. Yet the result is that the industry in Great Britain and Ireland is more prosperous than ever. Taking the last available Board of Trade Returns by which comparison can be made with previous returns, and beginning with Companies first, we find in the following short table which I have compiled, a succinct account of the position and progress of the gas industry in these islands:—

GAS COMPANIES.

Year.	Number of Companies.	Gas Sold in Thousands. Cubic Feet.	Consumers.
1882	352	45,484,000	1,055,000
1892	429	66,700,000	1,213,000
1903	459	93,923,000	2,385,348

MUNICIPAL GAS-WORKS.

1882	148	21,129,000	916,962
1892	182	34,531,000	1,172,704
1903	260	57,754,000	1,946,777

To sum up then the position is this, there are 719 undertakings altogether supplying 151,677,693 thousands of cubic feet of gas altogether to 4,331,125 consumers. Assuming that the total amount of gas made in Great Britain and Ireland in 1903 could be stored in gasholders each having a capacity of one million cubic feet, there would be required a row of such holders spaced at the least possible safe distance apart no less than 4883 miles in length. The paid-up capital expended in these undertakings amounts to £117,972,458 sterling.

From 1882 to 1903 covers the period representing, roughly speaking, the years of fiery competition with electricity which had all the prestige of novelty and the patronage of municipal authorities. Still, in these twenty-one years our industry underwent a transformation, and yet gave a good return to investors. Costly improvements were introduced for cheapening the price of gas, and at the same time reducing consumption. New fields of profitable supply were developed at great expense, too, in the application of gas for cooking, heating, and power; while a new and distinct zone of consumption was created in the working-class population, with the consequence that our industry has broadened and become more popular. The methods of manufacture, and the manner of consuming the manufactured article, have become more scientific; and gas has entered upon fields of

new endeavour, and occupies them so extensively, that it would require a man sanguine beyond the verge of rashness to anticipate that there can be any possibility in the future of displacing gas from the pre-eminent place it occupies for lighting, heating, and power to-day. We, upon this side of the Bristol Channel, have not a very large, but still a respectable, share in the great progress that has been made. The capital invested in gas undertakings in Wales and Monmouthshire amounts to £2,655,322. This is very good considering the large tracts of Wales devoted to agriculture, and the small proportion of large towns. To induce people to live on the land, and depopulate the towns, may be considered a good policy; but so far as our industry is concerned, it would be an untoward policy.

We should make a vast mistake if we were now to rest upon our oars, and consider our work done, because we have emerged so triumphantly from a twenty-one years' war. That mistake is one that I should earnestly counsel all those interested in the welfare of the gas industry not to permit themselves to fall into. The conflict is not over. Electric lighting is still in the field—is still aggressive; and numerous schemes and inventions are being daily put forward in order to increase the lighting value, and reduce the cost, of this illuminant. I have no anticipation, however, that there is any liklihood of these efforts being crowned with success, if average energy is put forth by gas managers. Electric lighting has failed to give satisfaction in the public streets of the capital and in all the large and important towns. Yet public lighting has had more attention from electricians than private lighting; and it has been relied upon as the great advertiser that would lead to the universal introduction of the light. It is a failure. To hang up large or small arcs upon high masts at long distances apart, does not light a street. A restricted patch of dazzling radiance more or less steadily maintained around the base of each mast, with an intervening long space of darkness between each pair of lofty lamp pillars, is all that is obtained; and the darkness is only made more intolerable and gloomy on account of the intermittent radiant patches. But this brilliant intensity of light confined to a small zone around the lamp, and the failure to diffuse the light over the street, is a fault inherent in, and ineradicable from, electric lighting.

This however has not escaped electricians, and various devices have been tried, or are being proposed, for overcoming this defect. Much was expected, and by some much is still expected, from the Nernst electric lamp. The light in this lamp is obtained, as doubtless most of you are already aware, by rendering incandescent (by means of an electric current) light refractory oxides worked up into little white rods. When cold, the rods are insulators; but they become conductors when heated. It will be seen then that to start these lamps an auxiliary source of heat is required; and this is generally provided by a coil surrounding the glower fed with current from the main lighting circuit. This lamp was introduced to oust the incandescent gas-lamp. At the present moment there are upon the market very many varieties of this lamp which I need not describe.

The efficiency of an ordinary glow lamp is stated by electricians who have current to sell, at 3·5 watts per candle power; and by electricians who have neither current nor lamps to sell, at 3 watts per candle power—increasing to from 8 to 10 watts per candle power before the end of its life, that is to say during 1000 lighting hours. As compared with the glow lamp, the efficiency of the Nernst lamp is stated to be 1·5 watts per candle power—increasing to 2 watts per candle power during a life of 400 lighting hours. It is claimed that a ½-ampere lamp of the best type at 230 volts gives a better light than a gas-mantle. This is rather vague; but what is nearer the mark is this, that in the actual lighting of one of these lamps, for about 3650 hours, I have ascertained that with an average illuminating power of 60 candles it consumed in these hours energy to the extent of 380 units. Taking the price of electricity at 2d. per unit (which is below the average price charged for electricity for public lighting throughout the kingdom), the cost works out at £3 3s. 4d. for current only. A better light, constantly maintained and evenly distributed, can be obtained during the same number of hours from a No. 4 Kern incandescent gas-lamp at a cost of £1 16s. 6d. for gas at 2s. 6d. per 1000 cubic feet.

The illuminating power given by the incandescent gas-lamp is 25 per cent. higher than that given by the Nernst lamp; and if this is at all doubted I shall be very glad to see the following experiment carried out: That a side-street of considerable length be lighted with a certain number of ½-ampere Nernst lamps for half its length, and the remaining half with No. 4 Kern incandescent gas-lamps, and leave the public to judge as to the respective merits of both systems tested over 1000 hours. Here it will be noticed that I am not speaking of our high-power lamps, or the enormous saving obtained by intensification, but merely of ordinary incandescent gas-lamps. But the fact is that electricians are already becoming dissatisfied with the Nernst lamp, which in many cases falls away remarkably in illuminating power. They are looking forward to the "Tantalum," the osmium, the mercury-vapour, and the small-flame arc-lamp, as being better calculated than the Nernst to still further reduce the cost of side-street lighting. I do not presume to prophesy what the result will be; but I do think it the duty of gas engineers to give strict and close attention to all movements on the part of our rival, and take steps in time necessary to counteract them.

A good load-factor is also a matter from which the electrician expects a great deal in the reduction of his operating and capital costs. An ideal load for either a gas-works or an electric light station would be, of course, an unvarying load throughout the twenty-four hours of every day. This load, however, remains an ideal, unfortunately; and the only consolation that we have, as purveyors, is that we have—by properly utilizing our capabilities, and increasing our day consumption—a better chance of getting a suitable load-factor than our neighbours. It is well, therefore, to study carefully this particular question of the load-factor, because it has a vast bearing (as I have said, and as you will easily understand) upon both capital and operating costs. The load-factor is generally represented by electricians by a percentage; and so mention is made of a 10 per cent. load factor, a 20 per cent. load-factor, a 40 per cent. load-factor, and so on. But a very simple method of expressing what it means would be rather to look at the plant for a moment, and say that it means the percentage of the existing plant that would be sufficient for supplying all the current required if the load were uniform every hour all the year round. There is a discrepancy that exists, in load-curves—generally shown by way of diagram—in which the peak-load towers high during the maximum hours of consumption, just as with us, and the hollows represent the minimum hours. It follows then that the greater the discrepancy between the highest load and the lowest, the less the percentage which will represent the load-factor. Consequently the higher will be the charges both for capital and works' costs; while the less the discrepancy, the less will be these costs. Further, in order to arrive at this load, there is a formula employed which may be stated in the form of the rule-of-three, and would run like this. As the maximum load multiplied by the hours is to the entire number of units supplied, so is 100 to the load-factor. A short way of expressing it is this—

$$\frac{\text{Units} \times 100.}{\text{Maximum load} \times \text{hours.}}$$

The load-factor in a gas-works may be obtained by dividing the total number of millions of cubic feet of gas supplied in a year by 365. Then the proportion of maximum daily output to the quotient is the proportion which 100 bears to the load-factor, and may be expressed by this formula—

$$\frac{\text{Annual output} \times 100.}{365 \times \text{maximum day's output.}}$$

The outputs are reckoned in millions of cubic feet; and in leap years 366 is substituted for 365.

Having thus explained the load-factor, I will now say I am indebted for what follows to Councillor Alexander Sinclair, of Swansea, who read a paper at Edinburgh before the Municipal Electrical Association, on the "Effect of the Load-Factor on an Electric Station." This paper is one well worth studying by both electrical and gas engineers, although it is written by a gentleman who I understand does not claim to be an engineer. I have no time to quote from his paper here at any length; but I will just turn to some of the results which he presented, showing the effect on cost per unit of different load-factors. And first, I will take works' costs only:—

Load-Factor. Per Cent.	Works' Costs. Per Unit.
10	1·325d.
20	0·795
40	0·560
60	0·465

Again, he introduced in another curve the same costs *plus* management, rent, rates, taxes, insurance, &c., when it worked out as follows:—

Load-Factor. Per Cent.	General Costs. Per Unit.
10	1·870d.
20	1·180
40	0·830
60	0·650

And then, in another curve, he represented all the previous costs *plus* interest and sinking fund. He assumed an average capital expenditure of £120 per kilowatt of maximum demand, and allowed 5¼ per cent. for interest and sinking fund. The figures for this curve are:—

Load-Factor. Per Cent.	Total Costs. Per Unit.
10	3·959d.
20	2·040
40	1·258
60	0·937

Councillor Sinclair gave a further curve showing the cost per unit with varying capital charges; but the quotations I have made are sufficient for my purpose, which is to draw the attention of my colleagues first of all to the importance of keeping an eye upon our own load-factor, and secondly to study the progress of that of our neighbour. For so sure as the load-factor of an electric station increases, so surely and proportionately will the cost of electric current (with proper management) become reduced. This, too, is true of gas; so we should aim at making and maintaining as high a load-factor as possible. With the great number of cooking stoves in use, to which I shall refer presently, we have very much improved our load-factor.

The elements that go to give good load-factors to electricians would be apparently: (A) Public lighting, (B) power and heating,

(C) tramways, and (D) supply in bulk. Let us see how we stand in respect of these four items. In "A" we are ahead, and we should keep ahead. In "B" we are further ahead if anything than in public lighting; and there seems very little chance at the present moment, if we wisely maintain as we should do the high calorific power of our gas, that in the ordinary course of Nature, electric current could ever compete commercially with gas in cooking and heating. In "C" our chances of competition, it must be confessed, are *nil*. In "D," compared with a municipal electrical supply, we probably stand upon the same footing; but compared with one of the great electric power distribution stations, we stand nowhere. The supply in bulk for motive power will be, I take it, if it is safe to make a forecast, the main element upon which electric power distribution works will have to rely for any profit they are ever likely to make. Electricians have done very little prepayment work, while we have done a great deal of profitable work.

I believe I have here fairly stated the position of affairs, and compared the relative status of gas consumption with that of electric current. You will notice that in the enumeration I have given, the lighting of private consumers—including works, warehouses, shops, and dwellings, as well as prepayment meter consumers—has been omitted. The reason of this admits of easy explanation. Although the authorities for the supply of electric current are quite ready to take all business of this kind, it has for them a drawback, which on account of our superior storage it has not for us; that is, it lowers their load-factor. You see then how well we stand, and how more favourable are our opportunities for the future.

With respect to lighting of works, railway stations, docks, and warehouses, there can be no light to compete with a high-power intensified incandescent gas-lamp, both for superiority in illumination and cheapness in price. Presently, I will go a little further into this. Shop-window lighting is very much taken up by the electricians; but if you will notice in more than half the establishments that are lighted in windows by glow-lamps—at least it is the case at Newport—the interior is lighted by incandescent gas, and the outside window lighting in a similar proportion of instances by high-power intensified incandescent gas-lamps. On account of its great convenience, electricity has made headway in hotels and theatres. There people do not read much, and consequently the painful effect produced by the use of electric light upon the eyes is not felt.

At the recent meeting of the Public Health Congress, it was clearly shown that the electric light is decidedly harmful to the eyes. It cannot be denied that the chemical rays of the electric arc, and the naked filament electric lamps, are injurious to the eyesight. Attempts have been made by electricians to diminish these consequences by frosted glass and other expedients; but these expedients cannot destroy the chemical effects to which I refer. I am aware that, possibly, my electrical friends will retort by one of their ancient pleasantries upon the deterioration of the atmosphere by the use of gas. If gas is consumed in small ill-ventilated apartments, the complaint is reasonable enough. But, on the other hand, it has been well-established that, with ordinary care, natural ventilation is improved by the use of incandescent gas lighting. The heat of the burners causes a healthful circulation of the air, and tends to its removal. In all cases where ventilation receives an elementary attention, proper provision is made for escape. This is mostly the case now; for in a closed room a person, without the presence of any other source of heat than his lungs, would become enveloped in an atmosphere of his own carbonic acid and albuminoid ammonia—the blame for which gas has unjustly borne in days gone by, when people were afraid to open their windows.

If any scientific demonstration of this should be required, I refer the inquirer to the experiments carried out in 1902 by Professor Percy F. Frankland at the Birmingham Museum and Art Gallery. His experiments showed that the percentage of carbonic acid during the use of incandescent gas-burners with proper ventilation diminished, because of the assistance given to the ordinary ventilation by the burners. Hence for domestic lighting as well as for shops, works, and warehouses, incandescent gas is daily growing in favour; and as its supply does not hurt our load-factor, it may be taken as certain that there will be a constant advance in this branch of our business of which we hold so much already. The conclusion I now draw from all that I have set down is that, in our own province, we are very satisfactorily placed, but not inassailable.

I will now turn back to Councillor Sinclair's paper, and give you the returns of a few of the local electrical concerns and the load-factor.

	Load-Factor. Per Cent.		Total Costs.*
Colwyn Bay	7·38	..	2·70d.
Hereford	8·45	..	2·20
Llandudno	8·41	..	2·20
Newport	15·30	..	1·42
Cardiff	15·85	..	1·39
Swansea	15·81	..	1·39

* Not including interest and sinking fund.

Going outside the locality, however, the highest load-factor which Mr. Sinclair has given is that of Motherwell, which is 27·06 per cent., and their costs are 1·02d. At Devonport, where the load-factor is 20·46 per cent., the costs per unit are 1·16d. Now, from the perusal of these figures, another reflection naturally arises: What is to be thought of the electricity committee who, with a load-factor of under 20 per cent., offer electricity at 1d. per unit? It may be answered that it is only offered as a day-load, and that consequently only operating charges are to be considered, and capital charges omitted. I quite grant that this is a possible position; but in the long run I do not see its advantage, because selling below average cost price at any time cannot be a means of raising the status of the concern as a whole. But, unfortunately, the explanation is not correct, because I have known the offer made for works including the lighting, and both the power supply and the lighting would be taken on during the time of the peak-load. Nothing in this world is obtained for nothing. So somebody, and that the wrong body, has to pay for this. What right has any committee, under any pretence whatever, to perform an act of this description, which, disguise it how you may, is nothing less than robbing one section of the public to pay for the convenience afforded to another, and that the smaller section?

It is sometimes said by a growing minority that a public authority should not run a concern for profit. I ask, Why not? Where municipal authorities own gas undertakings, they have made and do make a profit. They look very keenly for and after these profits, and they are right. They manage their concerns with care, obtain good men to do the work for them (as they also obtain good men for their electrical undertakings), and generally speaking apply the profits well—excepting when they apply gas profits to pay for the dissipations of its younger rival, electricity. The profit arising out of any undertaking is generally considered as an index of the abilities of those who direct its affairs; and "no profit" requires no ability to attain it.

Fortunately, I am glad to say that up to the present there is no considerable body of gentlemen occupying public places in this country who are prepared to go the whole length of saying that in municipal undertakings there should be no profit; but there is a tendency that way evidenced by the expressions of some, and by the actions of others. But if the cry of "no profit" is ultimately to prevail in respect of all departments, then I am not unreasonable in asking, What is the use of a committee at all? Committees are formed not for technical but for commercial ends. If there is no commercial end to serve, then there should be no committee; and the work should be left to those that understand it in its technical bearings, and who I am positively certain would do better without, than with the aid, of any committee holding the view I have indicated. The only risk would be that, without direction, they might slip into the mistake of making a profit as a test of their working.

Of Electrical Power Distribution Companies there are now nine, viz.:—

Name of Company.	Total Capacity in Kilowatts.	Total Capital Expended.
Cleveland and Durham County Electric Power Company	750	£90,583
In course of erection	4,000	
Clyde Valley Electric Power Company	8,000	£400,000 Authorized.
Derbyshire and Notts. Electric Power Company	720	£1,800,030
In course of erection	4,000	
Kent Electric Power Company	2,500	Chatham Works burnt down.
Lancashire Electric Power Company	6,000	£300,000
Midland Electric Corporation for Power Distribution		
Newcastle-upon-Tyne Electric Supply Company	17,500	£1,147,405
South Wales Electrical Power Distribution Company	7,640	
Yorkshire Electric Power Company	6,000	£152,000

These Companies are very fond of putting forward that for lighting purposes electricity at 1½d. per unit is equivalent to gas at 1s. 6d. per 1000 cubic feet. This short statement conveys incorrect information in two ways—implied and direct. The implied error conveyed to the unthinking is that 1½d. will buy as much electric energy as would be equivalent to eighteen pennyworth of gas; and the direct error is that electric current when sold at 1½d. per unit will give for 1s. 6d. the value of 1000 cubic feet of gas. I do not intend to waste time over such statements as these. Without a doubt, 1000 cubic feet of gas for lighting purposes is now equal, under the present intensified incandescent gas system, to 30,000 candle-hours—a result which can only be obtained by incandescent electric lighting, using the glow lamp, by the absorption of 120 units, and in the best type of Nernst lamp (when perfectly new) 52·5 units. It is easy then to make a comparison. The glow lamp would cost for electric current, equivalent to 1000 cubic feet of gas, 15s., and in the Nernst lamp 6s. 6¾d.

There is one word I wish to add, in conclusion, before passing from the question of lighting; and it is that, while we should continue our efforts to introduce the best burners, and the best mantles, and the very best system of consumption, all will be thrown away if the gas authority does not itself inspect and maintain the mantles and burners. Tradesmen are offering in nearly every town cheap, worthless mantles. From this fraud the public should be guarded; and every consumer should be induced to burn as much of his gas as possible on the incandescent system, and hand over his burners for inspection and maintenance by the gas authority.

I have devoted, you see, an unusual space in this address to a question which electricians are of late most anxious to shelve. They do not like comparisons made between gas and electricity. This is one of the reasons why I recommend that the comparisons should be made and repeated as often as possible. It is an old question, I admit; but I take the liberty of saying that I have considered it in a new form. My second reason for devoting so much attention to this matter is that our great success has not damped the energy of electrical engineers (for which I respect them); and therefore, instead of diminishing, we should follow up our victory by fresh conquests. It will require now-a-days energetic and continuous activity to bring good, cheap gas to the consumer. But granted this activity, its great superiority over electricity for lighting purposes will maintain its hold upon the favour of the public.

Incidentally, I may mention that, although I do not complain that gas is tested for illuminating power, I still am puzzled to know why electric current is supplied for lighting without any test whatever. I have no desire to impose upon my friend the electrician any test; but if a test is any advantage to the public, then the public is not treated rightly by the omission of a test for electric light. I am clearly convinced also that the present mode of testing gas for illuminating power is antiquated since the introduction of the incandescent gas-light, and was never a fitting test for varying grades of gas; that, in fairness, it either ought to be abolished altogether, or one more in accordance with modern progress and common sense introduced instead.

A good source of income, and one that should not be neglected, is the gas-engine. I published in June, 1904, a full account of a practical test which I made of gas and electricity as sources of motive power.* The gas-engine used during the test was not a new one, and was not consequently of the latest and best type, and was not got up specially for the occasion. The element against it was that, while its safe constant load was 13½ brake horse power, it was worked during the trials only up to 6·2 brake horse power. The electric motor was of the Byng-Hawkins type (made by the General Electric Company) and was a good motor. I will say no more here but just append the table which was the result of my practical tests.

Price of Gas per 1000 Cubic Feet.	Costs, at Various Prices, per Unit of Electrical Energy Capable of Performing the Work done by One Pennyworth of gas.					
	1d.	2d.	3d.	4d.	5d.	6d.
s. d.	d.	d.	d.	d.	d.	d.
3 0	1·112	2·224	3·336	4·448	5·560	6·672
2 10	1·176	2·352	3·528	4·704	5·580	7·056
2 8	1·250	2·500	3·750	5·000	6·250	7·500
2 6	1·333	2·666	3·999	5·332	6·665	7·998
2 4	1·428	2·856	4·284	5·712	7·140	8·568
2 2	1 538	3·076	4·614	6·152	7 690	9·228

Here I have similar advice to give (a product of long experience), that I have already given regarding the maintenance of the incandescent mantles. Gas consumers should be advised by the gas engineer to adopt only the newest type of gas-engine made by the best makers; and the next step should be to see occasionally how the user treats his engine. I will take one point only, lubrication. Improper or defective lubrication is the destruction of a gas-engine. The piston does its work under very peculiar conditions. It is driven at great velocity, and is subjected to high temperatures. The interior wall of the cylinder is regularly brought into contact with ignited and expanded gases. This high temperature will volatilize and sometimes burn the oil. Only the very best sort should be used. Cost, which is too much considered now-a-days, should be but a minor consideration. An impure oil—impregnated with acids, and leaving a residuum after combustion—will destroy the gas-engine wholesale. This should be constantly, and by means of tests, practically, brought home to the user of gas-engines.

And while on the question of gas-engines, I will now turn to another variety of the same subject—viz., the plant called suction gas plant. Gas producers have frequently, in years past, been operated by suction; but the suction gas plant which has recently been introduced is operated by the exhausting action which a gas-engine effects in taking in its charge. The whole plant consists generally speaking of a generator from which the gas is passed to an apparatus, called the evaporator, in which the water is converted into steam by the heat of the gas or fuel, or both. This steam, together with air, is drawn into the lower part of the generator. From the evaporator, the gas proceeds through the scrubber; from the scrubber to the gas expansion chamber; and thence to the gas-engine, where it does its work. In addition to this, there is a small manual fan (necessary as a bellows) for blowing up every morning until gas-making has started.

In some of the newer suction plants, the generator and evaporator are in the same shell. The steam then is generated in the evaporator by the heat of the producer. In such a plant as this, it is usual to introduce a dust-box between the combined generator and evaporator and the scrubber. The interior lining of the generator is of the best fireclay. I will not venture to name the maker of any one of them, because at the present moment their name is legion; but, generally speaking, I will say that there are two kinds of plant marked out from each other by the position of the evaporator—viz., those with generators which have internal evaporators and those which have these fixed external to the generator. To make matters more clearly understood, I may mention that the cylindrical body of which the generator consists is a steel or cast-iron cylinder containing a refractory lining, and forms in itself a sort of vertical boiler in general appearance, with a feeder at the top, a producing chamber in the middle, a grate below this, and an ashpit at the bottom.

Of the quality of the gas produced, you can judge better from the following analysis showing the average composition of suction gas made from a producer consuming anthracite:—

Nitrogen (N)	55·3 volumes per cent.
Carbonic oxide (CO)	20·3 ,, ,,
Hydrogen (H)	15·5 ,, ,,
Carbonic acid (CO_2)	7·2 ,, ,,
Methane (CH_4)	1·2 ,, ,,
Oxygen (O)	0·5 ,, ,,
Calorific value	136 B.T.U.'s per cubic foot
Volumes of air required for complete combustion of one volume of gas	0·946
Volumes of products of combustion per volume of gas	1·767

By proper enrichment, coal gas can be brought to yield a calorific value of 700 B.T.U.'s per cubic feet—that is, a calorific value five times greater than suction gas. There are very few samples of town gas that ought not to possess a calorific value four times greater than suction gas. This plant—however useful in places where town gas is not available—can be of no advantage within an area where the latter is supplied at a reasonable price.

The low fuel cost is put in the forefront, as the great reason for adopting this plant. It is often the only reason given by makers; and they are wise in their generation, for it is the only good point about the plant. Nothing is said of the water required, nothing of the low calorific power of the gas, nothing of the reduced efficiency of the engine, nothing of the frequent stoppages, nothing of the danger of tar being carried forward, or a mistake on the part of the operator, nothing of the everlasting nuisance created by the plant, which compels it to be fixed mostly in an open space, which renders the nuisance more detrimental to neighbours than to the user. This nuisance is very real—consisting of a disagreeable smell, a good deal of noise, and a proportion of dirt and smoke; while the waste water from the scrubber is often run into the drains, a practice which is illegal. Nothing is said of all these, neither is the user informed of the cost of wear and tear, of the cost of labour, of the interest and depreciation on the generator and scrubber, as well as the depreciation caused to the cylinder and other parts of the engine by the use of the impure gas produced.

It is claimed that for a suction gas plant, of from 10 to 100 brake horse power, the fuel consumed at full load will not exceed 1 lb. of anthracite, or 1¼ lbs. of coke per brake horse power per hour; so that the fuel costs only a little over 1-10th of a penny per brake horse power. All other costs are conveniently left out; yet it cannot be claimed for any suction gas plant up to 50 brake horse power that the cost of the gas produced is less than one halfpenny per brake-horse-power-hour. My experience is, however, that it is considerably more; but coal gas at 2s. 6d. per 1000 cubic feet will easily beat suction gas up to 50 brake horse power without any of the drawbacks attendant upon the latter plant. As we proceed up the scale, to (say) 150 brake horse power, the price must keep continually descending; but at 150 brake horse power coal gas at 1s. 6d. per 1000 cubic feet will still beat suction gas. Future progress is more likely to be on our side if we maintain the rich quality of our gas.

I have found that, in spite of an expansion chamber, the uniformity of rate of flow of the air and steam through the fuel bed, and the gas through the scrubber, is not always realized. The engine stops when this is the case; and it is a very troublesome thing to restart it. Then there is to be considered the question of installation. Let me give you a simple instance: A purveyor of mortar manages barely to drive one mortar mill with a suction gas plant. With the same engine adapted for town gas, he can drive two similar mills very easily. His business has increased and he wants two. What is he to do? Is he to double his capital charges, creating a loss to his business, or is he not more likely to adopt the sensible course of adhering to the use of town gas which up to 80 brake horse power cannot be rivalled, and even up to 100 brake horse power where the load is variable and the work intermittent?

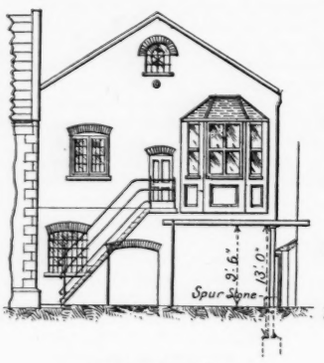
I have referred to the great necessity there is for gas companies to instruct consumers in the right use of gas for lighting, power, and the absolute necessity of systematic maintenance of mantles. I wish to be no less emphatic, but even more so, in regard to the maintenance of cookers and gas-fires. This is too important a point to be lost sight of. If cookers are to be maintained in favour with the public, they must be kept perfectly clean. This work cannot be trusted to consumers as a general rule. If the gas authorities are not to lose by their investment of capital in these cookers, they must be kept in efficient repair. I will not waste time in proving what will be admitted by all. When there are a large number of cookers in towns such as Newport—where there are no less than 10,000, being one to every seven of the population—a systematic method of cleaning and repairing must be adopted. My Directors held this view, and receiving their

* See "JOURNAL," Vol. LXXXVI., p. 649.

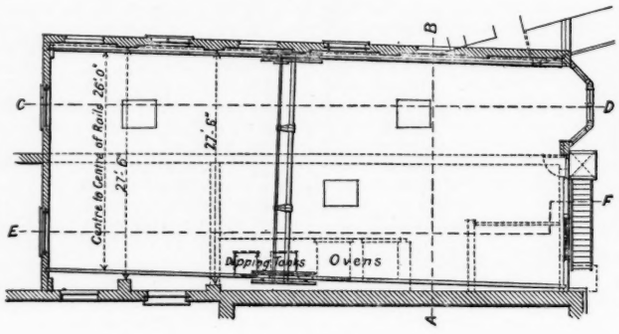
instructions I designed and erected the cooking and repairing establishment which is illustrated.

As will be seen from the drawing, the cookers to be cleaned and repaired are carried by a cart under the repairing shop, and raised in 43 seconds to the first floor, by means of the travelling hoist; the cart being reloaded similarly with the cleaned and repaired cookers, which are delivered to the consumers. The dirty cookers are taken apart; the jacketed bodies are heated in the ovens shown underneath the floor (in order to soften the grease), and then scraped and washed; while the whole of the remaining fittings are dipped in a boiling solution of caustic soda contained in one of the overhead cast-iron tanks, and rinsed in the second tank which contains hot water. The tanks are heated by the waste heat from the ovens, one furnace only being necessary. After this treatment, the cooker parts, which now present the appearance of clean castings, are varnished; the brass parts polished; and, being again screwed together, the whole presents the appearance of a new cooker fresh from the makers. Two men only are required in this department; and their time is fully occupied. The whole operation of cleaning and repairing costs us as nearly as possible on the average 11·25d. per cooker.

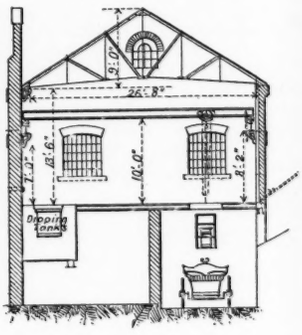
I have already explained why I have devoted so much of this address to the consideration of the question of comparison between gas and electricity as illuminants. I think I am right in doing so in view especially of the works now being erected, or brought into active operation, belonging to the great Power Distribution Companies. I venture to say that these companies will not press their light upon non-users of electric current for power; but they will press municipalities into selling current at or below cost price. Our profession should thus keep itself alive to every movement made by electricians whether important or not. I am not opposed to being aggressive either; I think we have been too long on the defensive. I have exhibited to you the only legitimate chances that electricity has of ever becoming a distant competitor—but still a competitor—with gas for lighting; and these are an improved lamp and an improved load-factor. I am aware of the vast power revealed by Providence in electricity, and of its great utility as a motive power, a conveyor of sound, and that it will yet be a transformer and conveyor of optical vibrations, so that the day will come when a man in London will regard at his leisure Paris or New York and *vice-versâ*. But from extensive experiments made by myself in the early eighties of the last century, although in another direction and for another purpose, I discovered that lighting is not one of the properties of the electric current, only an accident. The highest efficiency, therefore, of electricity will not be developed in the direction of brilliant and diffusive lighting. I only know of the sun a little of what astronomers tell us; but I will venture to say that its light-producing and heat-producing properties are more akin to gas than to electricity. It is the high calorific power of coal gas which gives to it that unrivalled vitalizing energy which renders it universally unapproachable for lighting and heating, and also as a source of power within certain limits. I have endeavoured also to point out a few of the drawbacks



Front Elevation.



Plan



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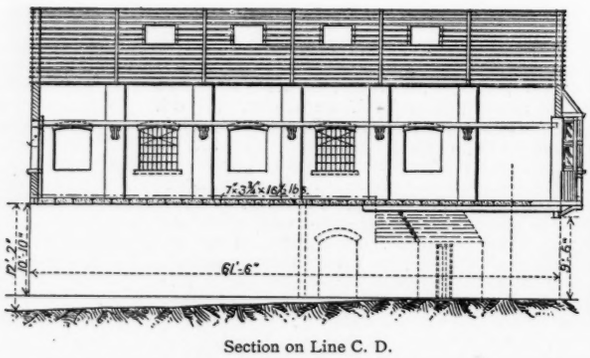

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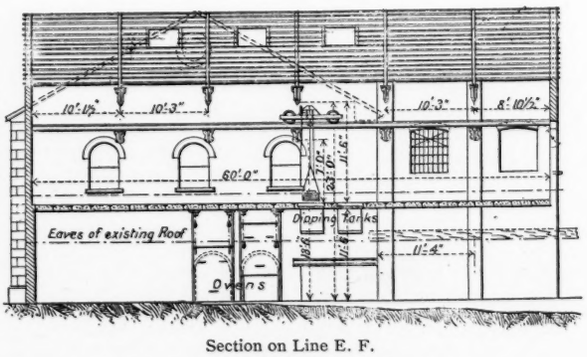


Section on Line E. F.

THE COOKER CLEANING AND REPAIRING SHOP AT THE MILL STREET WORKS OF THE NEWPORT (MON.) GAS COMPANY.

attendant upon suction gas producers. We must see that the public have correct information about them, and about the superiority and comparative cost of coal gas.

I have only alluded indirectly to a question of great importance—that is the manufacture of good cheap gas. It is our business to study carefully, and apply as promptly as may be (and most of us are doing this), the best system of manufacture. This is indeed necessary; but, after all, the prosperity of a gas undertaking depends mainly on two factors—low capital and cheap raw material, provided the raw material is good. South Wales is blessed with an unrivalled steam coal, which is not fitted for gas making, as the best coal which can be obtained for this purpose within our coalfield is but a poor semi-bituminous coal carrying the high price of a steam coal, and needing enrichment by one material or another brought at great expense from a distance. It is therefore rather to the credit of the gas managers of Wales and Monmouthshire that they do so well as they are doing.

If we turn to the North of England for coals, the freight is higher to our coast than to either the East or South Coast. Comparison between our working and that of those situated in districts where the best gas coal is to be had at a low price should be always made after due allowance for this extra cost of material. Good cheap material may easily cover management that is not superior to our own. It becomes imperative, therefore, that we should continue to modernize our methods of working by the judicious adoption of every recognized improvement. We have made as great progress as any other district in competition with all rival illuminants; and we have now to see how much further we can advance upon what has been already achieved. These questions of manufacture, however, have been dealt with so largely already by so many of our brethren, and the inaugural addresses and papers already issued on the later developments of gas-making have become so voluminous and easy of access, that it is only necessary for me to refer you to the work of those who have already dealt with these matters.

It was difficult indeed for me to find anything new to say to you, and I have therefore confined myself to that aspect of our industry affording indications of how best to maintain and further advance our position with the public. I have touched a fringe of new ground, I have thrown it may be a fresh light on old paths, but still I can only look upon myself as a gleaner passing over fields almost fully reaped by others—a sort of Autolycus in fact, who in a different sense concentrates his attention upon "unconsidered trifles."

At the close of the address, there was a hearty round of applause.

Mr. R. A. BROWNING (Neath) said he rose with very great pleasure to propose a cordial vote of thanks to the President for his address, which contained much original thought and good advice, and afforded plenty of food for reflection right through.

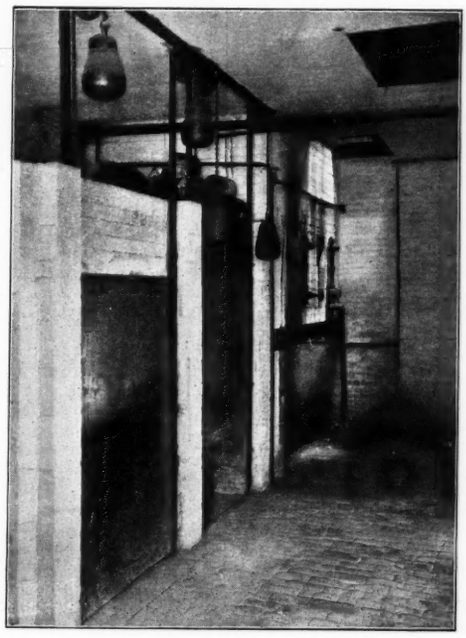
In it he had taken up the cudgels against electric lighting; and no doubt they would all agree that when erroneous statements were made by electrical engineers, as gas managers they should take the trouble to refute the arguments and try to put the matter right.

Mr. E. Jones (Pontypridd) seconded the vote. He felt quite sure that the address to which they had just listened would be of great service to them in South Wales, where they possibly held a unique position. Their friends in England had few of the disadvantages they had in South Wales, where they had poor gas-making materials and found a great amount of opposition. He thought they had had a real practical address. It was no academic display, in which many of their electrical friends indulged. They found it, and would find again on reading through the address at home, a great comfort. It would show many of them what the long scientific experience of their President had brought into print.

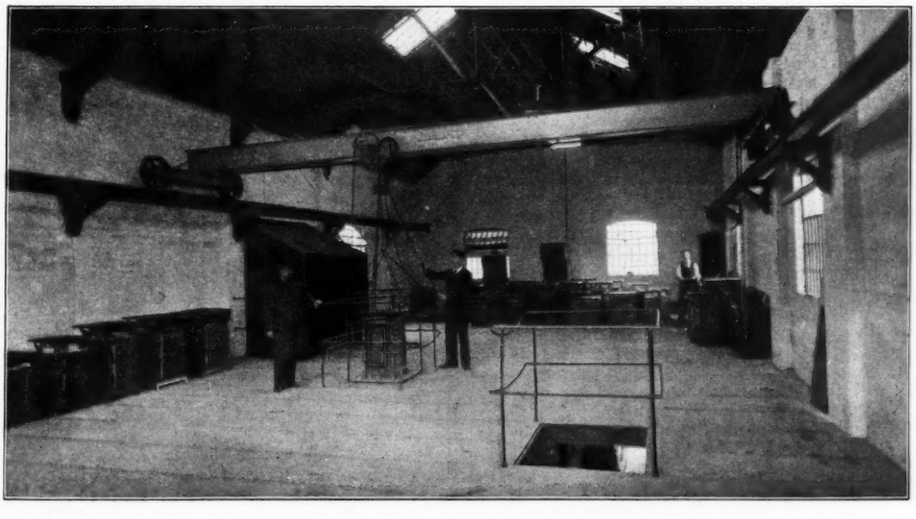
Mr. C. Wood (Bradford) asked to be permitted to support the vote of thanks. It had been an eloquent address, and was one that would repay careful study. Of course, a presidential address was not matter for discussion; but he must congratulate Mr. Canning upon the way in which he had exploded some of the fallacies of the electrical engineers. He (Mr. Wood) came from the town which had the first electric lighting undertaking of its own; and though that had been in existence a long time, gas was, he was glad to say, more than holding its own in Bradford now. They were getting back large numbers of customers, and the electric services were being taken out from many places in Bradford. He had no doubt that if they could put cheap gas before their customers—they were already selling it at less than 1s. 10d. per 1000 cubic feet to large consumers—they would still go on increasing their sale. They felt they must make some concession for gas for power purposes, in order to compete with the suction-gas plants now coming so much into vogue. And this was the more so because many of the drawbacks to suction-gas plants (to which the President had referred) were now being overcome. He would, in conclusion, like to emphasize how glad he was to be able to come to their first meeting in Wales, and to wish the Institution every possible success. He could not understand anybody thinking that there was no room for District Associations. He had been connected with the second largest District Gas Association in the country for twenty years and more. In his district they had quarterly meetings; and although some had thought that four meetings in the year would prove too many, in their latest development, in Manchester, they had found such advantages that they were now holding monthly meetings of the Commercial Sections of the parent body. This was practically his first visit to South Wales; and it seemed to him, from the time it took to get to Cardiff, they were so much cut off from other parts of the country that it was more important than ever for them to have such an Institution as had now been started. He had listened to the presidentia address with great interest; and he could not but feel that the President must have spent much time and trouble and thought in preparing it.

Mr. C. White (Blaenavon), in supporting the vote, said the President's address was only characteristic of the thoroughness with which Mr. Canning did everything he put his hands to.

The motion was carried by acclamation, and the President briefly expressed his gratification at the favour which his address had found.



The Ovens for Cleaning the Gas-Stoves.



The Finishing Floor.

Reading of Papers.

Two papers were submitted for consideration by the meeting. The first, which was read before the mid-day adjournment for lunch, was by Mr. Edward Jones, of Pontypridd, describing his experiences with the Fiddes-Aldridge simultaneous retort charger and discharger. The paper appears elsewhere to-day (p. 684), and should be read in conjunction with the extended account of the construction and working of the machine which was given in the "Journal," with a series of photographic illustrations, nearly a twelve month ago—viz., on Oct. 5, 1904. At the close of the discussion on the paper, the members adjourned for luncheon; and, on reassembling, Mr. Thomas Acland, of Llanelly, read his paper on "Incandescent Lighting" (see p. 686), which elicited a long and interesting discussion.

Next Place of Meeting.

It was resolved, on the motion of Mr. Small, seconded by Mr. Browning, that the next meeting should be held at Newport in May.

Votes of Thanks.

The President expressed the view, which was cordially endorsed by all present, that their meeting in Cardiff had been a most successful one in every way; and he moved a vote of thanks to those who had read the papers which had led to such interesting discussions, and had been the means of giving a considerable amount of information to all present.

The meeting closed with votes of thanks to the President for his conduct of the day's business, and to Mr. Octavius Thomas for his energetic work, as Hon. Secretary, in the formation of the Association, and his successful arrangements for the comfort of the members attending this the first meeting.

At the close of the proceedings the President kindly entertained the members to "High Tea" at the Park Hotel.

The formal opening of the new Talla Water-Works, for the supply of Edinburgh, has been definitely fixed for Thursday the 28th inst.

NOTES ON STOKING MACHINERY.

EXPERIENCE AT THE TREFOREST GAS-WORKS OF THE PONTYPRIDD URBAN DISTRICT COUNCIL.

By EDWARD JONES, of Pontypridd.

[A Paper read before the Wales and Monmouthshire Gas Association, Cardiff, Sept. 6.*]

I have consented to offer these notes at the request of the Secretary, not with any intention of drawing comparisons, invidious or otherwise, between types of drawing and charging machinery, but simply to give a description of the machine in use at the Treforest Gas-Works.

Before doing this, it may be of interest to note the conditions previous to the installation of the stoking machine. In 1902, my Committee granted the eight-hours' system to the stokers, and, later on, to the enginemen also, with increased rates of pay and reduced weights to be carbonized per man. The following year I was called upon to report upon the necessity of extensions due to expansion of business. In 1903, Parliament granted further borrowing powers to the extent of £25,000; and, as will be seen by the following statement, the progress of the undertaking justified such requirements:—

	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.
Gas made, millions. .	105	96	88½	83½	73¼	68	63¾	57¼
Ordinary consumers .	1168	1098	1077	1016	968	950	947	951
Slot consumers . . .	2083	1846	1633	1270	985	684	379	145
Totals . . .	3251	2944	2710	2286	1953	1634	1326	1096

I was further instructed to incorporate with the report observations on the desirability of introducing labour-saving appliances throughout the works.

It is necessary, perhaps, to give some idea of the works. The Local Board acquired the Pontypridd works in 1892; and, under the advice of Mr. Thomas Newbigging, new gas-works were constructed at Treforest in 1895. The works were constructed for a make of 1,000,000 cubic feet per diem. The first section, complete throughout for an output of 500,000 cubic feet per diem, was constructed. The retort-house, which contains the subject for my notes, is 115 feet long and 64 feet broad, with a height that lends itself to any method of gas making. There are, at present, five beds of eights, or 40 through retorts and 80 mouthpieces. The section of the retorts is ⏢, 22 in. by 16 in. Down the full length of the one side of the house is the coal-store, which is 30 feet wide. The coal is brought into the store by an overhead railway in specially constructed waggons (belonging to the Committee), with bottom doors and sides arranged so as to self empty. The railway is 14 feet above the level of the charging floor. The furnaces are full-depth regenerative. The charging floor is supported by girders on to a retaining wall; the cellar being half the width of the floor. I quote a clause from my report whice explains the position:

> The works being new, the retort-house lends itself, without structural alteration, to any adaptation of machinery—an advantage which, with few exceptions, only modern retort-houses claim. Previous to the general adoption of regenerative firing and inclined retorts, houses were constructed of limited height and without cellaring (except in stage houses); and, consequently, any adoption of the modern labour-saving appliances and apparatus meant reconstruction all through. Now this is not so with us, as any appliance can be adopted upon its own merits.

I take the opportunity of thanking the various firms for the information so generously given. The gas industry is much indebted to such firms for the untiring manner in which they have endeavoured to reduce the arduous and laborious manual labour of the retort-house. After carefully considering each method on its respective merits, the cost of installation, and the conditions attached to it, I came to the conclusion that our make would not warrant the putting down of power charging and drawing machinery necessitating two drawing machines, two charging machines, and coal breaker and elevator and hoppers to distribute to both sides of the house. I then considered manual charging, and found that the chief advantages were not so much monetary gain, but greater regularity of work and independence from skilled labour. Hand stoking or shovel charging was destined to continue for the time being. Not that I am dissatisfied with the manner in which it is done—far from it; any manager might be proud of the men engaged under me. But events move fast; and in these days of keen competition—with the Council's supply of electricity and free wiring, with the South Wales Electric Power Distribution Company advertising a guarantee of a full and efficient supply for power and light to any person within the Pontypridd Urban District Council's area at a rate of 1½d. per unit, and with the ratepayers calling out for a greater contribution to the rates and the consumers for a reduction in their gas rates—for these and other reasons, it is a necessity greater than ever that a gas-works should be equipped with the most up-to-date methods of manufacture.

* In connection with this paper, attention may be directed to the extended (and fully illustrated) description of the plant referred to, as given in the "JOURNAL" for Oct. 5, 1904, pp. 245-8.

The old adage that "dividends are made or lost in the retort-house" is as true to-day as of yore. It is here that the greatest expenditure takes place. As a result, machinery has been introduced to replace hand labour wherever practicable, and greater interest in the subject of stoking machinery has been evinced during the past two years. The many new and novel devices and developments show that even moderate-sized works of 50 million to 100 million feet are disposed to seriously consider the advisability of doing away with the hot and arduous task of stoking by hand and adopting some one of the designs upon the market. The problem in the retort-house is to take the coke from the retorts and replace by coal with the minimum of labour and time; the operations being so performed that the one shall not interfere with the other. Until recently, the machine did nothing except charge the retorts; but during the last two or three years the operation has been completed by the aid of two machines, one to discharge and the other to charge.

During this year, I have had in operation at the Treforest Gas-Works a stoking machine which charges and discharges simultaneously. It is not meant by this that the one operation is followed by the other, but that the two are actually accomplished in the same period of time, so that if the machine were stopped in the middle of the operation we should have half the coke out and half the coal in the retort. It must be conceded that this is finality itself, so far as the placing of coal or coke is concerned; and in this respect no improvement is possible, for it is a well-known axiom that two things cannot occupy the same space at the same time. The operation described enables the coal to follow the coke without appreciable loss of time or space. The machine—known as the Fiddes-Aldridge—practically does this, and in such a way that the charge is perfectly level, and while the coke is pushed out at the far side it does not interfere with the charging. The simultaneous operations have never failed; but we have had breakdowns caused by the use of cast-iron gearing instead of steel, and on occasions the engine and the electrical arrangements have failed. It is some twelve months since I saw the machine, then in course of construction; and arrangements were made with Messrs. Fiddes and Aldridge to erect a machine at Treforest Gas-Works, and fully equip it with the necessary electrical plant.

The description of the machine is as follows: The discharging-charger is built in sections, which are hinged together and are wound on a wheel, the periphery of which comprises nine flat surfaces. The discharging-charger is constructed of side plates, with distance-pieces between them, on which distance-pieces are hinged plates, the purpose of which is to push the charge of coal along the retort, and on the return to swing forward and assist in levelling the top of the charge. The discharging-charger is, when in use, to all intents and purposes a rigid push-plate conveyor. The bottom of the retort represents the bottom of the conveyor trough. The Pontypridd machine carries a hopper to contain 30 cwt. of coal, and below the hopper is the shoot, through the slide door of which the coal is allowed to fall into each section of the discharging-charger as it passes along. The machine, with its gearing (which need not be described in detail), is mounted on a carriage and a framework of channel iron, strongly braced together. The machine runs on rails laid 10 feet apart on the floor of the house; and embodied in it is a 6-horse power electrically-driven motor of the enclosed type, by means of which, and with the aid of the steel clutch gearing, the traversing, the raising and lowering to each horizontal row of retorts, and the discharging and charging are all accomplished. From front to back the machine frame measures 12 ft. 10½ in., its width is 5 ft. 9 in., and the extreme height of the inner frame when serving the top retorts is 16 ft. 3 in. This will show approximately the space occupied. The weight of the machine is 9 tons 2¾ cwt. without coal. Towards the front of the machine, the three switches for the operations of propelling, raising and lowering, and driving the discharging-charger are fixed handy for the driver, who has standing room on the machine in such a position that he can see the operations are all going forward in a satisfactory manner, without being himself exposed to smoke, flame, or steam. The machine is a simple one, and so is the operator's task.

Ultimately it may be that the electricity supply for driving the machine motor will be obtained from the District Council's electricity works—that is, if they can supply the Gas Department at a price below rather less than 1d. per unit, for which they are themselves generating the electricity required at present. The electricity is generated by a Crossley 14½ brake horse-power gas-engine, geared to a Crompton bipolar dynamo in the exhauster-house, some little distance away. The dynamo will give about 10 kilowatts at nominal speed. It has been mentioned that the motor on the machine is rated at 6-horse power; but for discharging and charging only 3½-horse power is needed. From the generating plant to the retort-house, and along its length on the side where the machine is working, the current passes by two overhead bare copper wires, and is conducted to the motor by a sliding contact at the top of the machine. Working intermittently, as at present, it is found that about ½ unit of electricity is expended per bed of eight retorts; and you will bear in mind, in considering this, what has already been said about the low generating cost. It is, however, the raising and lowering that absorbs the greatest amount of power. Four electric lamps are also used—one over the coal hopper, one on the machine, one over the engine, and the fourth over the dynamo.

It will be readily understood that difficulties had to be removed. The retorts were blocked in the centre; and arrangements had to be made for loading the hopper. A wooden platform was erected (capable of holding 10 tons) from the partition wall to directly over the bunker; and the coal is wheeled direct from the trucks. The difficulty of removing the backs was overcome in due course; but we were unable to realize the benefits anticipated during the winter, owing to the demand for gas necessitating the exclusion of small (in preference to large) coal and cannel, which, without a coal-breaker, made it impossible to use the machine. It was not until the spring of this year that full advantages of the machine could be obtained; and the minimum number of retorts for our summer use—viz., 24 through retorts—have been dealt with. The discharging has been perfect, while the charges are all uniform and level.

It is impossible to give positive figures, owing to the spasmodic action, due to the want of supplementary machinery; but it will be seen that, situated with the coal-stores on one side and the machine dealing with the retorts on the same side, a perfect sequence of operations from coal-stores to hopper, from hopper to machine, from machine to retort, and ejection from the retort at the farthest side, it was only a question of having a sufficient number of retorts to operate upon to guarantee commercial success, as, without considering the coal loading or coke removal, one machine-man and two lidsmen would be able to deal with at least 160 retorts. The average time for discharging and charging is 45 seconds, and the electricity expended is $\frac{1}{2}$ unit per bed of through retorts. The time of operation does not allow the retort to cool, nor do the side plates of the conveyor get hot, as might be expected. The short time the retort is open enables charges to be burnt off; and where a better class coal is used and four-hour charges, the make per mouthpiece increases with the minimum outlay.

Economical results with any stoking machinery like that here described must, however, be aided by its accessories—such as overhead hoppers, coal-breaker, elevator, &c. Without these, no beneficial results can be obtained; and for this reason I am unable to give you reliable figures as to cost of working. I am informed that several installations have been erected, and that gas engineers will within the next few weeks have an opportunity of seeing the machine working under the most favourable conditions at the Wavertree works of the Liverpool United Gaslight Company, where Mr. Edward Allen has, as a result of inspecting the machine at Treforest, installed the system.

In view of the amount of machinery now used in gas-works, it behoves engineers to turn their attention to electricity as the most convenient and flexible form of power for operating various machines and appliances distributed about the works. Where power is not obtainable at a reasonable price per unit from the electric supply company or the corporation, a central power house, with gas-engine driven dynamo, makes a very convenient outside source of supply. I am given to understand that Mr. Allen will read a paper upon the results obtained at no distant date; and it is to that paper we must look for any definite figures as to cost of working.

In conclusion, the author is not forgetful of his indebtedness to the Chairman and members of the Gas Committee for their permission to have the machine erected, and the encouragement and facilities given for experimenting. Often what looks well on paper becomes valueless in the rough handling of the retort-house; but so far, with the exceptions noted, the machine has justified the claims made for it, and, with the complement of elevating and conveying machinery, would compete forcibly in cost per ton with inclines or any other method of carbonizing.

Discussion.

The PRESIDENT expressed the hope that this first paper contributed to the Association would be fully discussed, in all its aspects, by the members present.

Mr. W. LISTER (Porthcawl) said he was present when the machine in question was first put to work; and he was glad to find it had proved very successful, and that Mr. Allen, of Liverpool, would shortly be having a similar machine at work. He (Mr. Lister) would like to know if Mr. Jones had experienced any difficulty with the carbon in his retorts, in having to pull back the charger over the top of the coal; also what (if any) difficulty he had found in making his blocked retorts into throughs. Did he find much difficulty in getting back his pushing rod over the centre?

Mr. T. ACLAND (Llanelly) said he fully appreciated Mr. Jones's difficulty in not having had enough experience thus far to speak more fully. It appeared to him that the scraping on the floor of the retort might prove detrimental, and threaten its lifetime. Experience alone, however, would show if this was so or not. As to the question of carbon in the retorts, he could quite see that it was a very reasonable question to put. He hoped between now and the end of the present year to inspect retort machinery of various kinds in other works.

Mr. J. M. SMALL (Merthyr Vale) asked if anyone might, if he went to Pontypridd, be allowed to see the machine.

Mr. JONES: Oh yes, certainly.

The PRESIDENT said that Mr. Jones, in speaking of the work of the machine at Pontypridd, referred to the former blocking of the retorts in the centres. He would like to know if the removal of the central block would not constitute a serious obstacle in the working of the machine. He went to Pontypridd, but did not notice any special blocking of the retorts; for, of course, the amount of blocking would, in any case, be very small. He might point out that there was no part of the machine that touched the floor of the retort. The whole bottom was open, and there were loose flaps, which passed over the deposited coal when the pusher was discharging. It pushed the coke out, and the coal was left in the retort without any touching of the retort itself by the machine. He might possibly be wrong about the pusher; it might perhaps, in some way, bear upon the floor of the retort, but it was decidedly not visible. He would like Mr. Jones's view as to what was the right time for any works to apply such machinery. Should it be when the maximum make of gas was half-a-million, or one million, or two millions? Take manual machinery, as an example. He thought that it might be applied with advantage at any time. In respect to other machinery, however, worked by machine power, he had always thought and believed, and had seen it proved, that when they reached a make of half-a-million cubic feet per diem they could safely employ machinery that would be occupied a sufficient number of months in the year to enable it to produce a profit. He knew that many gas engineers in the North did not believe this; he had, in fact, met some such in the Manchester district—including Mr. Newbigging. He believed Mr. Newbigging said he would not think of installing machinery unless his maximum in the winter reached a million. His (the speaker's) own idea was that half-a-million was the time to begin; for then they would have the machine going a sufficient number of months to secure an advantageous return. Still, he would like to hear something from Mr. Jones on the subject.

Mr. CHAS. WOOD (Bradford) said that a few years ago stoking machinery was, of course, only applicable to the very largest works. He would remind his hearers that the conditions of gas manufacture in South Wales were somewhat different from those existing in the North of England; and what would pay in the one district would not necessarily do so in another. There were now on the market several types of power machines applicable to small works; and it seemed to him that this should be a very great source of gratification to them as gas engineers. Apart from cost of carbonizing, the indirect advantages to the workmen and all concerned were very great. He did not think that they would have any trouble with the carbon on the retorts with any of these forms of machine. He would look forward with great interest to the continued use of the Fiddes-Aldridge machine; and he would look for the results of Mr. Jones's work later on, as he was sure they would be of great interest to gas managers in other parts of the country. He regretted to learn from Mr. Jones's paper that it appeared to be necessary to employ electricity for driving the machine motor. He did not like "giving advertisement" to the electrical departments in this way. He thought that compressed air might do the work just as well.

The PRESIDENT said he would like Mr. Jones to tell them what quantity of coal he worked at Pontypridd—that was, per charge per twenty-four hours.

Mr. JONES, in reply to the remarks of the various speakers, said he was much obliged for the kind things that had been said in reference to his paper; and he only wished he could have given more particulars from a commercial point of view. Mr. Lister was desirous of knowing how about the carbon. As the President had remarked, there was less tendency for the accumulation of carbon on the retorts with the working of the machine than there was in hand-charging. Any retort that the machine would not charge, it was time to have out. Mr. Acland had asked about the machine damaging the bottom of the retorts. He (the speaker) regretted that he had no model of the machine, as it would have made matters quite clear. But he might in a word say that the machine was not like the ordinary pusher with a continuous rod, but simply a box to contain the charge of coal, with two quarter-plates which went along the retort. After five months' continuous wear, he had not found that there was the slightest impression on the bottom of any of the retorts. After referring to the difficulties under which they had worked, Mr. Jones said that they carbonized from 28 to 30 cwt. of coal per 24 hours in each retort. It was charged in 7 cwt. lots. He was sure Mr. Wood would find the coal that they used very different to the good Yorkshire silkstone with which he was probably more familiar. They were quite content if they got 9500 cubic feet to the ton. Regarding the question of using an electric-motor on the machine, he said he found that compressed air and gas-engines were not nearly so handy as having a central electric station, and taking his current from it. They must not shut their eyes to modern methods, if more economical, even though apparently in opposition to their gas-making ideas. He would be very pleased at some future time to give full particulars of his carbonizing results with the machine which he had at work.

Mr. R. A. BROWNING (Neath) said that when they had to carbonize only 34 cwt. of coal per man per day, it was indeed time to go in for machinery. He purposed, after a complete twelve months' working, to give them a paper on his experience with the "D.B." machine—with figures and everything concerning it. At present, he could not give them anything very definite. They had a "D.B." projector, which was working most satisfactorily; but they hoped to accomplish still more in the future than they had done so far. They had only now got the charger; but they hoped shortly to have a discharger as well. This would make the installation much more complete; and then they expected to effect a greater saving than was possible at present.

INCANDESCENT LIGHTING: ITS EFFECT UPON THE GAS INDUSTRY.

By Thos. Acland, of Llanelly.

[A Paper read before the Wales and Monmouthshire Gas Association, Cardiff, Sept. 6.]

The subject of this paper suggested itself to me in consequence of the effect the general adoption of the incandescent burner in place of the flat-flame system of lighting has had on my Company's business, especially during the past twelve months. I am not going to deal with the theory and practice of incandescent lighting, &c., in any way. Perhaps everyone present knows more about these things than I do myself.

I wish to confine myself to the results of my investigation, which show that the additional business at Llanelly during the years 1903 and 1904 was as follows: Number of meters fixed, 509; gas-cookers fixed, 556; gas-engines, 13; public lamps, 23—total number of new consumers, 509. But, notwithstanding this, the sales of gas up to June 30 last showed a decrease of 4,045,000 cubic feet compared with the previous year.

I have had a comparative analysis of the accounts made out and find (1) as to public lighting, that 36 large lamps with three and four cluster burners converted to one incandescent burner each, show for the same number of burning hours a decrease of 55·4 per cent. in the quantity of gas consumed; (2) places of worship and public buildings converted to the incandescent system of lighting show a decrease of 43·5 per cent.; (3) business premises, shops, &c., show a decrease of 35·4 per cent., which explains, I think, the cause of the falling off in the sale of gas. I have no doubt that this is the experience of other gas managers to a more or less extent. At first sight, it is not encouraging; but natural increase and development will soon overtake this, and correct matters.

I am bound to say that I am gratified at the future prospects of the gas industry. The incandescent burner places a weapon of immense power and value in the hands of gas companies, and strengthens their position in competition with other systems of lighting—considering that, compared with flat-flame lighting, four times the volume of light, of a much superior quality, is now being supplied at three-fourths the cost, by the ordinary mantle, and, when used with the latest and most up-to-date inverted incandescent mantle, at one-half the cost, if burnt under proper conditions, of course. The gain, therefore, to the consumers is a real one, and equivalent, indeed, to a reduction in the price of gas. The tendency of the age is to have more light. This means still more burners. Low gas bills will encourage this. When consumers appreciate the full advantage of adopting incandescent lights, and become better acquainted with keeping the burners in proper order, the better it will be for all concerned. My opinion is that with the lowering of the candle-power of gas, thereby helping to reduce the selling price, further improvements will be made in incandescent burners and mantles to increase the light-duty given, the cost price will be lowered, and ere long we shall be able to buy ordinary mantles at 6d. per dozen, and inverted ones at 1s. per dozen, and the flat-flame burner will become as great a curiosity in British towns as it is already in some of the Continental ones, particularly Berlin.

A word should be said in praise of the makers of the really artistic and elegant gasfittings which have been produced of late years. Well and admirably adapted for use in incandescent lighting, these contrast favourably with anything in the market. Some recent inverted burner fittings are so well designed that they add much beauty to places fitted with them. These fittings tell a lot in the adoption of a system of lighting, when electricity and other lights are in the field to select from.

In conclusion, in my opinion, the gas industry stands to-day in as good a position as it ever did before. It has been well said that gas-cookers, the gas-engine, the slot-meter, and the incandescent mantle have granted a new lease of life and power to gas companies. This is undoubtedly correct; and the truth of it is exemplified every day. Businesses started a few years ago in the manufacture of these things have not only grown into huge concerns, but have multiplied in numbers, and the demand still increases.

Discussion.

The President said that the paper to which they had just listened was a short one; but it afforded, in his opinion, ample opportunity for good discussion. It dealt with a subject of paramount importance to them at the present moment. If they fairly looked at the question, the introduction of the incandescent mantle had been to them the real lever of importance by which they had been able to cast aside the tremendous attacks made right and left upon their industry. How important it had been, they might at once realize if they carried their minds back to the time when there was no incandescent mantle. It had caused a notable revolution, and had changed the face of things tremendously—not in England so much as abroad. Incandescent gas lighting was the popular feature which touched everybody. Many things which only influenced a few, were very important; but incandescent gas lighting affected the many, and had really done wonders. It had certainly come to stay. He (the speaker) would not here say anything about the folly of people spending enormous sums of money on electric arc lighting when they could have a cheaper light than they had before by means of the incandescent gas light. With respect to the reduction of consumption in places of worship mentioned by the author, the decrease of 43·5 per cent. was not so alarming as it looked. Churches were places where there was a good deal of piety and devotion; but they were not remarkable for consuming much gas or much electricity—neither did public buildings generally. So that the decrease of 43·5 per cent. was not a matter of very great importance. The really important point was that, in many business premises, there was a decrease of (roughly speaking) one-third in the quantity of gas used; but then there was the statement made by Mr. Acland that, compared with flat-flame burners, four times the volume of light was now supplied at three-quarters the cost by using the ordinary mantle. Thus a consumer now had for 9d. as much light as he formerly secured for 4s. No doubt, there would be a great extension of gas-lighting in quarters where in the past they did not have it. Turning to the question of gas-fittings, he (the President) said he had not felt any great degree of satisfaction with the work that had been done recently by makers of gas-fittings. He did not regard them as at all artistic; nor did he think they were anything to compare with the fittings produced by the very same people for electric light. He believed that the makers of gas-fittings thought that, when electric lighting came in, it was going to be a splendid opportunity for them to extend their business; and they took full advantage of it. But what he blamed them for now, was that, when they stepped back again to produce gas-fittings, they tried to palm off on gas people some of the antiquated fittings of thirty or forty years ago. He hoped such treatment would not be tolerated in any way. They should devise fittings suitaole for the new light they now had—the incandescent. What was suitable for the argand and the old flat-flame burners, was not suitable for incandescent lighting. If the makers wanted to secure a profit, they must lay themselves out to give the public a better article. He would beg of the gas profession that they would demand from these firms designs that were worthy of being compared with those produced for the purposes of showing off electric lighting. He wanted to give their rivals every possible credit; but, in the matter of fittings, those for electric lighting showed up much superior to gas. He did not thank the former makers of gas-fittings for coming back to gas; but now that they had come back, they must be made to keep up to date, and produce something adequate to the splendid light gas managers and engineers were supplying at the present time—something that would meet the public taste.

Mr. J. H. Canning (Newport) asked Mr. Acland if he could furnish them with the consumption of the flat-flame burners he referred to, and of the incandescents which replaced them. The most noticeable thing in the paper was the falling off in the consumption of gas that followed the introduction of the incandescent system. He took it from the author that in Llanelly they introduced the incandescent system rapidly. At Newport, they experienced a reduction of the same kind when incandescent lighting was first introduced; but the light had been introduced more gradually there, and they did not experience such a remarkable falling off in business. No doubt, it was preferable to lose a little at first, rather than hand the business over to their rivals, the electrical people. As they were, no doubt, all aware, the City of London was going in for incandescent gas light, instead of electricity; and this had caused a good deal of indignation—real or assumed—amongst electricians. Electricians were fully aware of the value of the incandescent gas light, and were using the most vigorous efforts to depreciate it. They were making great use of the report of the Borough Engineer of Westminster in favour of electricity. Now a similar report had just been published by the Electricity Committee of the Croydon Corporation, who were alarmed to find the City of London replacing electric arc lighting by high-pressure gas-lighting, on the score of efficiency and economy. This report merely compared electric arc lighting with ordinary incandescent gas light—they did not give credit to gas for the high-pressure light. He had gone into the figures of the report, and found that the average arc light at Croydon consumed 510 watts per hour, yielding an average light of 355 candles. The price charged for this was £18 per annum. Some arc lights consumed 690 watts, and others 450 watts; but all were charged at £18. This proved what had often been suspected—viz., that the charge made bore no relation to the quantity of current consumed. Now the real cost per annum of these arc lights might be obtained thus: An electric generating station and plant cost at least £80 per kilowatt capacity. Allowing for loss in distribution (usually about 20 per cent.), and loss in the conversion of mechanical into electrical energy (about 15 per cent.), each arc would require 750 watts, or ¾ kilowatt. The capital cost of generating plant for this would be £60. An arc lamp could not be supplied and erected for less than £35. This made a total capital cost per lamp of £95. Interest, wear and tear, and depreciation—which would be at least 10 per cent. on this sum—amounted to £9 10s. per annum. Carbons cost 16s. 10d. per annum; wages, £1 2s. 9d.; painting and repairs, 5s. Then, assuming that the hours of burning were 3700 per annum, each lamp would consume in this time 1880 units. In 1904, the total cost of production at Croydon amounted to 1·65d. per unit; so that current cost £12 18s. 5d. per annum. This made the actual total cost per lamp £24 13s. per annum for 355 candle

power. The 600-candle power gas-lamps in the City were supplied commercially at a profit, for £12 10s. each per annum. Electricity consequently cost 16½d. per candle power per annum, while gas cost only 5d. per candle power per annum. This was a specimen of the unfair treatment accorded to gas lighting. He referred to this Croydon report because it would be quoted by their electrical friends all over the country, and many people might believe it. Referring to the cheap mantles spoken of by Mr. Acland, he (Mr. Canning) said he found that cheap mantles at six times the price referred to—in consequence of their bad quality—injured the reputation of gas lighting. Then again he quite agreed that special attention should be given to the question of artistic gas-fittings, for the reason that electricians had obtained much business by giving due heed to this point in times past.

The PRESIDENT said that, supposing they introduced incandescent gas lighting extensively and so reduced consumption, were they not able to prevent the eventual reduction in their total quantity supplied, by the extension of the use of gas into other fields? Otherwise, there was something very depressing, he was afraid, in Mr. Acland's statement. He would like to hear that gentleman's views on this point. As far as Newport was concerned, they commenced the introduction of incandescent gas lighting from the very beginning. It had no doubt been introduced gradually; but at the present moment anybody, by looking round the town, could see how very widely its use had spread. At the present time. they were taking out a good deal of electric lighting fittings, and substituting gas in its place. But there was no doubt they would find a decrease in their rate of increase. Sir George Livesey had, on a former occasion, spoken of what he called a "decremental increment." He (the speaker) could only say that, whereas formerly in ten years they used to double their consumption, in ten years now they had gone up 67 per cent., in spite of the vast increase experienced in the use of incandescent gas-burners. It was foreseen from the very start that, on the introduction of the incandescent burner and mantle, consumers would find an enormous reduction in their quarter's bills. It would be necessary then to meet this reduction by starting out in other directions, and showing consumers how necessary gas was for their comfort and convenience. They must find every possible use for gas that they could outside and beyond mere lighting. He was sure, however, when the figures were brought out, they would still have to record that their lighting was the best paying portion of their business, and would continue to be; and therefore they must still cultivate the lighting. He hoped that no one would go away with any pessimistic view, that he would by introducing incandescent lighting injure his business in the long run. A big drop in some of their small concerns might possibly mean going without any dividend at all; and that would be a serious matter. Side by side with the introduction of the incandescent mantle, they must bring gas into use in other quarters. There was not a single gas concern in Wales that could not get gas used largely for cooking, if only the manager would energetically push it. There was a town in Monmouthshire practically the whole of which was at one time supplied with coal by the companies who owned collieries there. To-day there were between 500 and 600 gas-cookers installed in the place. This was a remarkable statement; but he knew the facts. It was due, he said, to the fact that the cleanliness, readiness, and convenience of the gas-cooker were now so highly appreciated that they overweighed the advantages of the people getting their fuel for nothing; and so they took on the gas-cooker. He believed they could all push new gas consumption for lighting very largely; but whether they could or not, they would be well advised as far as possible to energetically introduce gas for domestic cooking and heating. Mr. Acland seemed to have revolutionized Llanelly at one stroke; and the consequence was that he had met with the very big decrease he had referred to.

Mr. EDWARD JONES (Pontypridd) said that the interesting paper to which they had listened bristled with facts; but, like Mr. Canning, he would wish to know what number of clusters, and with how many lights in each, Mr. Jones had converted the flat-flames into incandescents. Speaking of public lighting to gas engineers, all would of course wish to support their own industry; and so he might remark that it had been within his province recently to defend the industry in Pontypridd, as far as possible, and show how these things come about—certainly not by fair methods. After his Council opposed the South Wales Electric Company, they were under the necessity of putting up works themselves within three years. They were told that they would be able to produce electricity at less than one-third the price of gas. After a good deal of pushing, however, the Electrical Engineer was asked to give a report, and then he said he could supply 2000-candle power lamps for £12 per annum each. Mr. Canning had that morning shown the fallacy of statements of this kind. But the Council were led by it to put down electric arc lamps on the greater part of the tram-road; and they removed sixty of the gas-lamps costing £180 per annum. But now they had had a Resident Engineer appointed, who actually said the electric lamps could not be maintained under £21 a year each. At the end of the present year therefore they would have about forty arc lamps, and these would cost about £800, as against £200 for gas. He would like to know whether some of this sort of thing was not due to the introduction of electric power into other districts. Referring to inverted gas-burners, the speaker said he had not yet seen one that was as successful as he would like. He quite agreed with Mr. Canning when he said that they should have some hold on the distribution of mantles to their customers, as it would be a great point gained if they could get them to use better mantles instead of the rubbish which was put on the markets. As things were at present, people often got disgusted, and reverted to the old flat-flame burner. After referring to the pneumatic lighter as a very good method for use in rooms and corridors, the speaker in conclusion expressed his agreement with the remarks of the President regarding gas-fittings, and said he thought they had come at a very opportune moment. They found the old water chandeliers of 20 or 30 years ago coming in again. He trusted gas managers would refuse the things at any price.

Mr. CHARLES WHITE (Blaenavon) said that Llanelly had always been a very remarkable town; and the statement by Mr. Acland had provided a conundrum that people outside Llanelly could not be expected to answer. Unfortunately, he (the speaker) came from a district where the chief industry had been under a cloud for some long time. There was nothing that damped the hopes of a gas manager like an unenterprising district council. His experience was that an industrial population in a colliery district were, as a rule, very slow to go in for gas-cookers.

Mr. GEORGE ANDREWS (Swansea) said that in his town they experienced a decrease for one or two years, but that was not entirely the result of the incandescent system coming in, but more the result of electric lighting. This year they were experiencing a smaller decrease. He agreed with Mr. Acland in saying that when one incandescent did away with three or four of the old-fashioned burners in public lamps and in private businesses, this alone meant a large decrease.

Mr. R. A. BROWNING (Neath) said that they were increasing the number of their customers and were having a substantial increase every year at Neath, but not the increase they would have got had flat-flame burners continued in vogue.

Mr. OCTAVIUS THOMAS (Pentre) expressed the view that part of Mr. Acland's decrease in gas consumption had been due to the weather. He (the speaker) had been increasing his sales ever since he had been up the Rhondda; but his increase had not been so great the last year or two. This he attributed to the mildness and fineness of the weather right through. Mr. Canning had referred to the use of gas-cooking stoves up the valleys. He (the speaker) was not quite at one with him in this matter. They would find in many houses that the coal fires (through the supply of free coal) were not out from one year's end to another; and, as to cooking arrangements, the frying pan was the only thing used six days out of seven. Why then should people use gas-stoves, for which they had to pay? He knew of one district where the average gas-consumption of the cookers in use did not exceed 2000 cubic feet per annum.

Mr. ACLAND, summing up the remarks of the various speakers, said he was pleased to be able to tell them that his decrease would soon stop; in fact, it was already stopping, and during the coming half year he did not expect to show one. The difficulty of the whole question, as far as Llanelly was concerned, was the high and unpopular price charged for gas in the town. It had driven the consumers to find relief by the only possible means they possessed—by turning off some of the gas, or by resorting to incandescent burners. He thanked the President for his remarks in regard to gas-fittings in general. His (the speaker's) observations on the subject had reference more particularly to fittings for inverted burners, which lent themselves most conveniently to a more artistic style of fittings. Still, he agreed that there was room for further improvement. Regarding his statement about 509 fresh consumers, that was quite correct, and was taken from the books of the Company at the end of the last quarter—in fact, he himself had been so much surprised at the decrease that he had considered he was justified in putting his few remarks into the short paper he had submitted. He and his staff had made an examination of about 700 of the accounts; and in some cases there had been a falling off of one-half in the gas consumed, compared with twelve months ago. He firmly believed that incandescent burners for domestic, public, and other purposes now fully represented from 70 to 80 per cent. of the total number in use. Such an increase could not go on in the future; and he quite expected to wipe out the decrease before the next twelve months were over. The District Council took the lighting question up about six months ago; and at the present time he had one or two lamps erected at the gas-works for the purpose of finding out which was the best type for lighting the streets. So far as his experiments had gone, the best appeared to be the inverted mantle giving 60-candle power, and which burned about 3 cubic feet of gas per hour by measurement. Of the consumers who had taken to incandescent lighting, some had removed sixty burners and had replaced them by twenty; while others had taken away two or three, and had replaced them by one. Of course, when this sort of thing went on to any general extent, it must make a huge difference to the output of gas. Had the flat-flame burners remained in vogue, he (like Mr. Browning) would, instead of a decrease, be showing a big increase.

The Johannesburg Council have confirmed the appointment of Mr. J. F. I. Thomas as General Manager of their lighting and tramways undertaking. Mr. Thomas was formerly Resident Engineer for the Consulting Engineers to the Council.

WAVERLEY ASSOCIATION OF GAS MANAGERS.

Half-Yearly Meeting at Loanhead.

The Eighty-Ninth Half-Yearly Meeting of the Waverley Association of Gas Managers was held in the Masonic Hall at Loanhead, on Thursday last, under the Presidency of Mr. J. TULLOCH, of Loanhead.

WELCOME TO THE TOWN.

Provost KERR, of Loanhead, welcomed the Association to the town. They were not accustomed, he said, in Loanhead to the presence of such a body as the Association. The Association, he understood, had done excellent work, not only in the interests of the members themselves, but in those of the communities they served. They felt honoured by the Association coming there that day, and more deeply so in their having elected the Gas Manager of the town as their President. There was no mistake that the President did not owe his position to any circumstances of birth or education, but simply to his capacity for hard work.

Mr. A. BELL, sen. (Dalkeith), in proposing the thanks of the meeting to Provost Kerr, said it was very gratifying to find that Mr. Tulloch's services were appreciated in the town.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—Allow me to thank you for the honour you conferred upon me by appointing me President of this ancient Association, the Waverley Association of Gas Managers. I say ancient Association, because this is our eighty-ninth half-yearly meeting.

Matters with us at Loanhead, so far as the manufacture and distribution of gas are concerned, pursue a very even course. Over nine years ago, my Company took over the Loanhead Gas-Works with brilliant prospects before them; for then the Clippens Oil Company were in full swing, and employed somewhere about 1300 hands above and below ground. Two years later, the Edinburgh and District Water Trust stepped in and interdicted the Clippens Company from working the minerals which lay under their main water-supply pipes leading to Edinburgh. It would, of course, have been a very serious matter for the City of Edinburgh had these large pipes collapsed through the supporting minerals being mined by the Company. The two parties have been fighting out the matter in the Law Courts for a number of years; and the works have been standing idle for over seven years. This, by impoverishing the whole locality, has had an adverse effect upon the Gas Company.

On taking over the works, my Company had to make a very large expenditure in practically renewing the whole of the plant; the renewals including a new holder, new retort-bench, station meter, governor, and hydraulic main. Notwithstanding that this meant practically rebuilding the works, they had also to lay over a mile of pipes of from 2 to 6 inches in diameter. Nevertheless, even with this heavy initial expenditure, and other drawbacks which I have mentioned, I am pleased to be able to inform you that we have, in this short space of time, been able to more than treble our consumption.

I am pleased to see, from the journals connected with our industry, that the opinion I have held for a number of years past is now taking root throughout Scotland—that is, an all-round reduction is taking place in the illuminating power of the gas supplied. I cannot understand why it is that Scotland stands out as an exception to the rest of the world as regards the high illuminating power of the gas supplied to the consumer. I am sure it is not because the eyesight of the people is in any way inferior to that of their neighbours in other parts of this planet. Perhaps the explanation may be found in the fact that Scotland is rich in cannel coal; and cannel coal having, until recently, been almost the only quality of coal used in the manufacture of gas, may probably be the reason of the high candle-power supplied. Cannel coal is now becoming scarce, and gas companies and local authorities have spent large sums in oil, benzol, and other enriching plant. Who knows but some day soon they will be inviting the scrap-iron merchant to bear that plant away for a trifle?

I am inclined to look upon too high enrichment as a somewhat nonsensical action. There is no necessity for a gas as high as 28 or 30 candle power. Let us lower the candle power, and give the consumer cheaper gas. Then consumption will go up, dividends will go up, and I hope salaries also. Since Welsbach made that grand discovery of putting a hood or mantle over the flame of a bunsen burner, high-power gas is not required. All we want is the heat for this system of lighting; and some of our splint coals in Scotland give us as high calorific values as some of what we consider our best cannel coals—aye, and sometimes as much gas. Therefore, we should consider these things, seeing that incandescent burners are now in the majority.

Electricity, the great opponent of gas, has tried to shoulder out our industry in many different ways. As yet, however, it has failed to do so, as the consumption of gas has increased in every town in which electricity has been introduced. In so far as price and lighting effect are concerned, I do not fear it as a serious competitor. Given fair competition, I do not think that we, as gas managers, need lose our sleep at nights over it.

The suction-gas producer has come to stay; and it is admirably suiting the purpose for which it was designed. It has found its way even into Loanhead, with the same result as in other places—namely, diminished sales.

I think that, in the clear but odoriferous liquid called paraffin oil, we have a really greater competitor than either producer gas or electricity, not only in Loanhead but largely throughout the Waverley district. The people who use it as a lighting agent believe that it is the cheapest of all lights. This is a delusion. In our own small burgh, where oil held, and does hold, the predominance, I have persuaded many consumers of oil to give gas a fair trial. I have always carefully advised them how to use the gas, whether with flat-flame or incandescent burners of the best quality; and I am pleased to say that since they have tried and found out the advantages of gas lighting over oil lighting, not one of them has returned to the latter.

Local authorities should wake from their slumbers, and, with the assistance of their managers, arrange for a course of illustrated public lectures to be given by some competent person on coal gas and its uses as a heating and lighting agent. Let the public clearly see the difference between good burners and bad burners, the wide contrast of illumination through different burners with the same gas, and how long they may burn gas for a penny for the purpose of boiling-rings, grillers, light, &c.; also, show them how a burner should be cleaned with the bristle of a clothes brush, and not, as many consumers do, with a pin, so completely spoiling the burner. I am sure you will have, like myself, in the course of your rounds, come across people (and one would think they should know better) who have great complaint as to the bad quality of the light they are getting; but on examining the bracket, in nine cases out of ten, you will find a defective burner, caused by being too long in use or by bad treatment.

Before concluding, gentlemen, there is one other point that has occurred to me, which I do not recollect having been touched upon at these meetings, and upon which I would like to say a few words. It is the disadvantage which gas managers in small towns labour under as compared with their brethren in the larger towns and cities in relation to the length of mains to be laid and maintained and the small number of consumers drawing their supply from these mains. As you are all well aware, the roadways are not causewayed as they are in the large towns; and, generally speaking, I find the mains laid too near the surface. They are, therefore, much more liable to injury from heavy traffic—such as traction engines, &c.—passing over them than in those towns and cities where the streets are more substantially laid, and therefore better able to support the heavy traffic, and so give better protection to the gas-mains lying beneath.

This leads to one of the difficulties which, as I have already said, always confronts the gas manager in a small and straggling town. He may have nearly a mile of main laid, and perhaps have only half-a-dozen consumers drawing supplies from it, with a total annual consumption amongst them of only, say, between 20,000 and 30,000 cubic feet of gas. This, as you are well aware, leads to greater risk of leakage; and when you also consider the condensation that takes place, the amount of gas consumed by these consumers does not give the gas company an adequate return for the loss that may be incurred in supplying the gas. This is one of the reasons why it is that we, in the smaller towns, have to charge a somewhat higher price per 1000 cubic feet to our consumers. Often we hear complaints from consumers as to the high price they have to pay for their gas, compared with the price paid by consumers in larger places. They never take into consideration the fact that, in a large city, there may be hundreds of people drawing supplies from a mile of main, whereas, as I have indicated, in a small town there may be only half-a-dozen consumers per mile of main. In a large town, whatever loss is made from leakage and condensation is more than made up for by the large amount of gas consumed and the resultant profit. In a small place this seldom obtains.

Discussion.

Mr. A. BELL, sen., was sure they were indebted to the President for his address. He was quite right in regard to the subject of illuminating power. They had now come to the point that, in Scotland, they had to reconsider their position. They were met in a district where rich cannel coal was secured in abundance, and they were in the presence of many representatives of the cannel industry; and so, probably, they should not treat high-grade gas very hardly. But it was the fact that they had to reconsider their relation to illuminating power. The cry of the people, year by year, was for more light. The ordinary flat-flame burner did not seem to satisfy them; therefore the incandescent gas-burner might be regarded as the light of the future. With it, they did not require illuminating power, but merely heat. It might be said that it required an expert to burn the old 28-candle cannel gas. It was certainly too rich for use in incandescent burners. They had many difficulties in the introduction of incandescent lighting, because people had been for so long accustomed to flat-flame burners; and it was no easy task to convince some of them of the advantages of the new system. Another difficulty they had was in the fact that the houses had been fitted up for the supply of high-quality gas; and to re-fit them would cause considerable expense. The consequence was that electric or oil lighting was sometimes adopted. As to the depth of mains, he would remind them that their mains were all

laid at a time when there were no heavy weights using the roads. Now they had 16-ton road-rollers, which might soon be increased in weight to 50 tons. He had an instance himself in which a road-roller fractured a pipe, the broken ends of which were actually forced out of the ground. It was quite true that they should not lay any pipe now at a less depth than 3 feet.

Mr. W. BROWN (Lasswade) said some of them were aware that last year he carried out some experiments with paraffin oil, because he found that the majority of the people were using oil for lighting, and he was being continually told that it was cheaper than gas. He bought three lamps—with a single, a double, and a round wick—and had them tried. He found that the single wick consumed a gallon of oil in 80 hours, and gave a light of 21·1 candles; the double wick consumed a gallon in 50 hours, and gave a light of 23·7 candles; and the round wick consumed a gallon in 26 hours, and gave a light of 45 candles. A year's burning with oil would cost £1 17s. 10d., and with gas £1 14s. 1d.—a difference in favour of gas of 3s. 9d. As a result of his experiments, he was able to convince not a few that gas was the cheaper light; and he had found that once they started gas they did not go back to oil. He had a very large and scattered district to serve. Last year, his sales increased by 400,000 cubic feet; and they were able to reduce the price of gas.

Mr. H. RUTHERFORD (Aberlady) corroborated what had been said about the long stretch of pipes. He had a stretch of about a mile, in which there was only one consumer.

Mr. P. BLAIR (Haddington) thanked the President for his practical address. There was a great deal of heavy traffic in Haddington; but he was not troubled with fractured pipes, except in cases where the road had been up and had been laid carelessly. He did not think there would be much difficulty in introducing a lower quality of gas; but more of it would, of course, require to be used.

Mr. D. MACFIE (Edinburgh) thought they would be all agreed that what Provost Kerr said of the President was correct—that he was a hard worker—because he made the statement that during the past few years he had trebled the consumption of gas in the district, which was a great deal. Whether or not the increased consumption was due to decreased illuminating power, he could not say, because the President had not told them whether his illuminating power was very much below 28 candles or 20 candles. They were agreed that the illuminating power of gas had been reduced all round in Scotland; but there was room for difference of opinion as to how large a reduction they could make. Gas companies and managers ought always to take into consideration the kind of coal they obtained within easy distance of their works, and the value they could get out of it. If it suited one man, in one part of the country, to supply gas made chiefly from cannel coal, there was nothing to prevent this gas being properly consumed, either in flat-flame or incandescent burners. They knew an ordinary "C" incandescent burner was set to consume 4 cubic feet per hour, of 26-candle gas, presumably at right pressure; but they could get equally good results from the burner if they set it to consume 2¾ cubic feet per hour. The introduction of the incandescent burner, and the spread of it—at which they all rejoiced—was not the only reason for reducing the illuminating power of gas, because they were aware that gas was largely used for power and for cooking and heating, and that, for these purposes, gas of low quality was more serviceable, and was as economical as a higher quality gas. But, as Mr. Blair said, if they reduced the illuminating power, it was inevitable their consumption of gas would increase. So it was a matter for calculation whether it would suit to reduce the illuminating power; but if a manager took the trouble—as Mr. Tulloch seemed to do—to enlighten his consumers as to the use of gas, the result would be very satisfactory. On one point he felt inclined to differ with the President, that was where he spoke of incandescent burners being in the majority. They were increasing in number; and if they ever came to be universal, there would be no further argument for high illuminating power gas. But he believed that to-day the larger number of burners in use throughout the country were not incandescent but flat-flame. So long as this was the case, it would not be wise, nor proper, to reduce the illuminating power to less than (say) 14 or 16 candles. They were in the belief that no such low quality gas was supplied in Scotland; but there were some who argued that even 14 candles was too high, which he himself did not agree with. They knew that in many towns gas managers were most careful to see that consumers were supplied with burners suitable to consume the gas they sent out; and if this were done, there was quite sufficient room for flat-flame burners in bedrooms, corridors, and other places where people were not in the habit of using a powerful light. They might take it that for a very long time flat-flame burners would be required. The cost of the incandescent burner remained a difficulty. Although it was becoming less, it was still, to working men, a good deal.

Mr. W. YOUNG (Penicuik) thought they had listened to an address quite out of the ordinary run, which they could take home and consider. He did not agree with the President as to the benzol plant. Two or three years ago he introduced benzol enrichment; and he would think twice before he would allow the plant to be carted away. He found it to be a great benefit.

The PRESIDENT thanked the meeting for the reception of his address. He would not think of reducing his illuminating power to 14 candles; but when they were making twice 14 he considered it was too high. With gas at 6s. 6d. per 1000 cubic feet, he could give a light of from 35 to 40 candles for 6½ hours for 1d. with a No. 2 incandescent burner. Therefore he thought that if this light were properly treated, and carefully governed, it was the cheapest and the best which could be produced. But when 14 or 16 candles served the purpose as well, it was but wasting good gas to use a higher quality. He observed that in Glasgow the illuminating power was down to 18 candles, while they in villages and small towns were making as high as 26 to 30 candles. If Glasgow could do with 18 candles, they in the Waverley district could do with gas of less illuminating power than 26 to 30 candles. The Road Trustees sent out a circular that they would not be responsible for damage caused to pipes which were not more than 16 or 18 inches below the surface. Whether or not they had this power he did not know. Since the road-roller had come into use, it was out of the question to lay pipes at a depth of 16 or 18 inches; but he thought the County Council should be responsible for any pipes they might snap, which were laid before the road-roller arrived.

PLACES OF MEETING NEXT YEAR.

It was agreed, on the motion of Mr. RUTHERFORD, that the meeting next April should be held in Duns, and the meeting in September in Peebles.

VOTES OF THANKS.

Votes of thanks were accorded to the President and to the Hon. Secretary (Mr. W. Young, of Penicuik); and this brought the meeting to a close.

The members and friends, to the number of about forty, dined together in the meeting place—Mr. Tulloch in the chair. The toast of "The Loanhead Gas Company" was proposed by Mr. D. Macfie, and that of "The Waverley Association" by Dr. Cameron, of Loanhead.

Afterwards the company drove to Burdiehouse Lime Works. The visitors were furnished with lamps, with the aid of which they walked down the incline into the pit, a depth of about 300 fathoms. The seam is a splendid one of fresh water lime, over 20 feet in thickness. It has been worked for several hundred years. On returning to the surface, most of the company drove into Edinburgh; and there the gathering broke up.

Settle-Padfield Vertical Retorts for Cleethorpes.

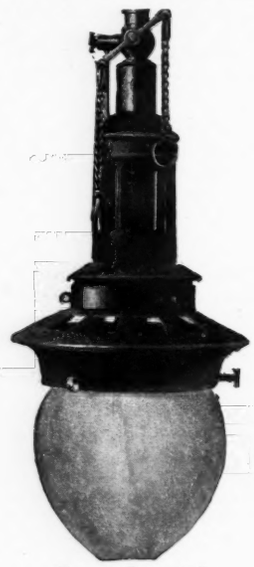
The President (Mr. R. G. Shadbolt) and members of the Eastern Counties Gas Managers' Association will, in accordance with the arrangements made at the last meeting, be visiting Cleethorpes for their half-yearly meeting on Thursday week. The gas-works at Cleethorpes are under the engineership and management of Mr. E. J. Brockway, the Vice-President of the Association; and, in view of the visit, it will interest the members to learn that the Self-Charging Vertical Gas Retort Company, Limited, have just put in at the works the foundations for a bed of six vertical retorts on the Settle-Padfield system, with coal elevator and all machinery complete. The work of erection will not have proceeded far before the meeting; but it may be stated that the general appearance of the bench will be much the same as that with which our readers have become acquainted by the photographs that we published some time since of the experimental plants. Incorporated, however, in this bench will be the improvements that have been effected in the charging device and other details. Messrs. Robert Dempster and Sons, Limited, are the contractors; and Mr. T. Settle is superintending the erection for the Self-Charging Vertical Retort Company, Limited. This is the first removal of the system from the scene of its experimental stage; and Mr. Brockway's experiences (which, it goes without saying, will be based on thorough working conditions), will be awaited with much curiosity.

Last Wednesday, Sir John Aird, Bart., M.P., and Lady Aird celebrated their Golden Wedding—passing the day quietly at Wilton Park, Beaconsfield. The "Westminster Gazette" on Friday said: "Not many Englishmen have had a more striking career than Sir John Aird. A millionaire to-day, and the most famous of great contractors, Sir John Aird's long and busy life has been a succession of triumphs, for he had at the outset of it everything against him. His grandfather was a working-man in humble circumstances, who was killed by an accident during the building of the Regent's Canal. His father held an insignificant position in a London gas company. Together, however, Mr. Aird and his son laid the foundations of a contractor's business off Brackfriars Road; and to-day the firm of Lucas and Aird is world-famous. It was the Nile Dam, of course, at Assouan which brought Sir John his title; but that was only the most conspicuous of many other famous achievements for which he has been responsible. The Milwall Docks were also the creation of his firm, together with the water-works of three great English towns and those of three European capitals. Then, again, it was Sir John who was responsible for the construction of the wonderful West Highland Railway, in the execution of which he was not a little aided by that child of his own creating—the 'steam navvy.' In fact, there are few parts of the world in which his beneficent activities have not been requisitioned."

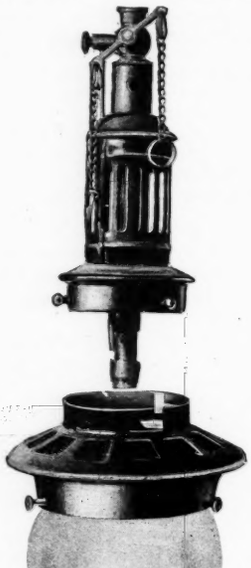
NOVELTIES IN GAS-LAMPS.

The General Incandescent Company.

The lighting season is close upon us, and lamp makers are now busy with the introduction of their novelties. The General Incandescent Company, Limited, have sent information about their new lamps and burners; and, from accompanying photographs, it is evident that they have produced some tasteful designs, and yet of simple structure and embodying certain conveniences. In the construction of lamps, the duty obtainable for a given consumption of gas is, of course, the first consideration; but it is also important to remember that the advance of the popularity of incandescent gas lighting depends in no insignificant degree upon the ease with which users are enabled to give attention to their lamps. In the lamps under notice to-day, this is a matter that has not been lost sight of. The "Corona" lamp, with bye-pass, is one of the General Incandescent Company's new productions. But the principal claim made for it is not one that commends itself to us. The Company say "it is practically a reproduction of the Nernst electric lamp." Upon this, we have to remark that the gas industry are not under the necessity of going to electricians for style, nor even for names, as some makers seem to imagine; and, as the Nernst lamp has been found to occasion a great deal of trouble to users, the hoped-for popularity is not being achieved. Therefore the less said about the similarity in outward appearance of the "Corona" to the Nernst lamp the better. However, that little criticism in passing. The base is easily detached, by simply undoing a bayonet fastening. An improved socket has been provided for the mantle, which enables any inverted mantle to be employed; and there is no danger whatever of breaking the mantle when renewing. The lamps are finished in chocolate and gold enamel, and are of elegant appearance. We are assured that they will not tarnish or discolour when in use; and the contingency of the lamp getting out of order appears to be remote. The Company's improved "Simplon" inverted burner, in burnished brass, is also, as its name implies, of simple construction, embodying the advantages in regard to being detachable at the bayonet joint, and being fitted with the new mantle socket, the same as the "Corona" lamp. The "Flambeau" high-power burner (chimneyless) is being made in two sizes—distinguished as 250 and 100 candles. These burners are of substantial construction, and as will be seen from the peculiar shape of the globe, they are intended to represent, when alight, a lighted torch.



THE "CORONA."

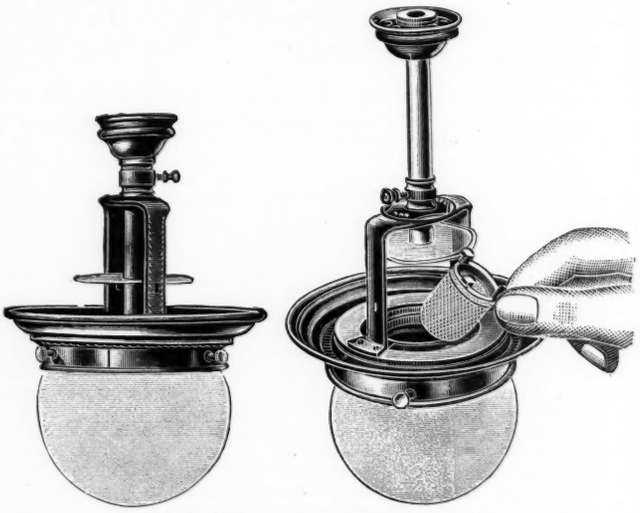


THE "CORONA" OPEN.

THE "FLAMBEAU."

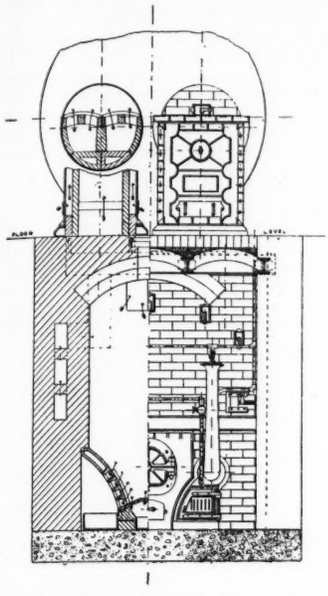
Provincial Incandescent Fittings Company, Limited.

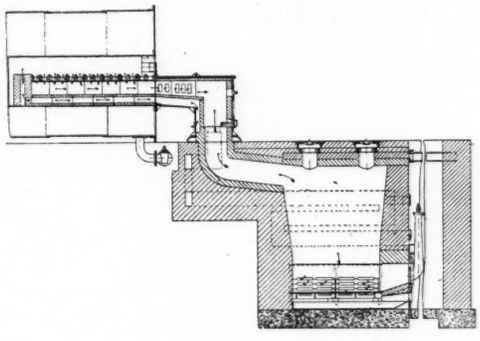
There is no doubt that in the coming lighting season inverted gas-burners will be a very popular line; and makers are recognizing this, judging by the number under various names that come before us. The Provincial Incandescent Fittings Company, Limited, are offering one under the title of the "Jepco." Makers are divided in opinion as to the advantage or otherwise of having inverted burners that are so constructed that they will carry any make of mantle; and there have been various devices invented to prevent more than one kind being used. Those who take these restricting steps hold that the limitation to one mantle is as much in the interest of consumers as in that of the maker, as it obviates the use of inferior mantles. But as these devices are made, the ingenuity of others are turned upon them to annul their effect; so that mantles can be used on any burner or the owner of any burner can have the privilege of using any mantle. While a wide range in the adaptability of mantles may embrace the disadvantage above mentioned, it must be conceded that it has also advantages for the consumer which restriction denies him. The Provincial Incandescent Fittings Company have, with other makers, taken the broad view of the matter, and have applied a patented contrivance to the "Jepco" burner which, we are informed, enables it to take any inverted mantle on the market. The illustrations show that simplicity is the feature of this arrangement. By the aid of a thumb-screw, the bottom part of the lamp can be lowered; and the mantle is then placed in position in the manner depicted. When this is done, the bottom of the lamp is merely lifted into its ordinary place, and is then again set by the thumb-screw. It will be seen that there is no necessity to remove the globe; so that this will prevent breakage through falling when attending to the lamp. The means for lighting the inverted type of burner are often responsible for mantle destruction; tapers and matches in the hands of servants being prolific in shortening the useful life of the mantles by being pushed carelessly upwards in the globes. In the lamp now under notice, the gas can be lighted at the top. In what follows, we have another illustration of makers labouring under the illusion that the gas industry are concerned in running as close as possible on the heels of the makers of electrical fittings, and are quite incapable of striking out into new lines of their own. "An important feature," it is pointed out, "of the 'Jepco' burner is that it burns successfully with an entirely closed globe." In other words, it has "a small opal electrical globe," which adds "greatly to its electrical appearance. . . . Attached to a metallic tube pendant, it could, in fact, be readily mistaken for an electric light, but for the superiority in its lighting capacity—the burner giving quite 70 candles with a consumption of 2½ cubic feet per hour." The gas industry has not the slightest desire for the beautiful inverted gas system, with its fine downward lighting power for a modest consumption of gas in good burners, to be mistaken for the electric light, so as to induce people to go to the wrong quarter for their lighting. We have in the incandescent gas system much to be proud of; and therefore we would advise makers of gas-fittings to drop all this nonsense about looking like something or other that is electrical, as it is gas and gas alone that we want the successes of the lamp and fittings makers to advertise.

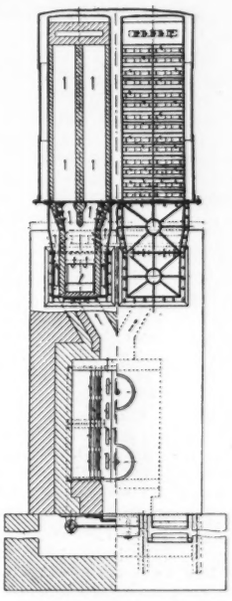


THE "JEPCO" INVERTED BURNER.

FIRING STEAM-BOILERS BY PRODUCER GAS.







A system of firing steam-boilers with producer gas has recently been patented by Messrs. R. & G. Hislop, of Paisley; and, in view of the savings that they claim can be effected in this way, some particulars of the proposal will be of interest to "JOURNAL" readers.

The system has for its object, they say, a more economical combustion of gaseous, liquid, or solid fuel than has hitherto obtained in the firing of steam-boilers, "by effecting a perfect commingling of the gas and air before being brought into contact with the surfaces to be heated, and thus remedying the present inherent defect in all systems of heating steam-boilers and constituting quite a revolution in this direction." The accompanying illustrations show the general arrangement of the producers, &c.

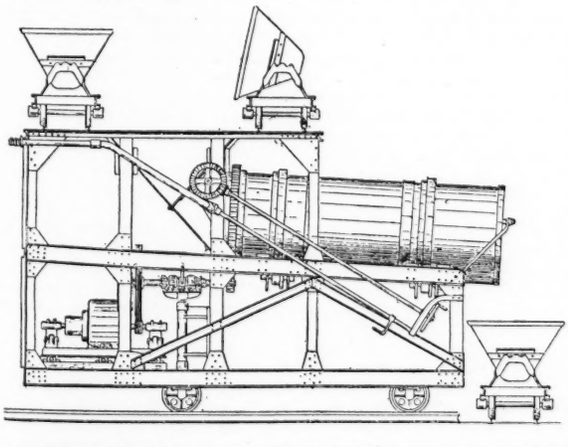
The fuel used—gas coke or coal—is gasified in the producer in the usual way. Before entering the boiler, however, the gases and air are mixed in a chamber or chambers in front of the boiler, and from which they pass into the combustion chamber placed inside the boiler flue or flues and thence through some specially formed screens. It will thus be seen that, in the case of Lancashire or Cornish boilers, the ash-pit is converted into a reservoir for highly heated gases, thus increasing considerably the heating surface of the boiler.

The producer is placed in front, and is preferably sunk to the floor level. Fuel is added through the top, either in bulk or with a feeder. Cleaning is necessary once in from 24 to 48 hours; and a steady steam pressure is obtained at all times. Perfect combustion of the fuel is effected; and therefore there is practically no smoke with the use of coal. Provision is made for shutting off the boiler at a moment's notice; and the whole arrangement is always under perfect control.

Installations erected are said to be effecting a saving of 25 per cent. in evaporation per pound of fuel, and at the same time giving 25 per cent. more water evaporated per hour as compared with hand fires. The producer, mixing boxes, and screens are found to be most durable, and therefore the upkeep is a small item.

A PORTABLE CONCRETE MIXER.

In the "JOURNAL" for April 25 last (p. 233), we described and illustrated a concrete mixer of simple design, invented by Dr. J. S. Owens, Assoc.M.Inst.C.E., of Tothill Street, Westminster. We now give, from the August issue of "Engineering Review," some particulars of a portable mixer lately described in the "Tekmisk Ugeblad" of Christiania, and shown in the accompanying illustration.



Cement, sand, and gravel are filled, in the proportions required, into tip-waggons that are conveyed up a plank flooring installed above the machine. The contents of the waggons are discharged into a triangular hopper, arranged between the rails, from which, through a shoot, the mass is introduced into the mixing-drum. The latter is made of steel plates about ½-inch thick, and provided with a toothed rim, to which motion is imparted from the electro-motor through a transmission and a four-grooved friction-wheel. The drum is, moreover, provided with two cast-steel rings running on four-wheel discs 10 inches in diameter. Inside the drum are installed nine angle-iron paddles, 34 inches in length, mixing the mass during rotation, and ensuring its homogeneity. There is, further, in the longitudinal axis of the drum, an iron tube, 2½ inches internal diameter, provided with three rows of holes. The upper end of the tube is connected to water conduits provided with cocks which allow of the required amount of water being accurately adjusted. The concrete is discharged from the drum immediately into tip-waggons, in which it is conveyed to the place of consumption. The mixer is mounted on a truck, the motion to which is imparted by the motor referred to, without the use of any friction clutch.

PORTABLE HEATERS.

Among the numerous workshop apparatus that Messrs. Wallach Bros. have introduced are what are styled the "W.B." portable heaters which should find useful occupation in connection with most engineering shops, especially for application to outside work. In these appliances, either gasolene or kerosene is the fuel employed. The oil is carried in a cylindrical tank under pressure; and is conveyed by a flexible connecting tube to the large burner at the end—the whole being in appearance much like the well-known forms of spraying-machines for paint, &c. These portable heaters are really on the principle of a large blow-pipe with a very powerful flame, which can be accurately directed to the exact spot that it is required to heat, without heating up surrounding parts. Important work can thus be effected *in situ*; and thus, it will be seen, there must by its use be in many operations a considerable saving of labour and time. The applications of these heaters (which are made in several sizes) are many; one of them being the melting of lead out of pipe-joints, in which work several burners may be used simultaneously. A companion to the portable heater series is a compressed air-oil heater, which is adapted for intermittent work where it is necessary to close down the flame, and to be able to instantly restart it. The appliance is really a modification of the heaters already described; but its advantage lies in the fact that the burner does not require to be heated before it begins to generate gas. The compressed air atomizes the oil, so that the flame can be lighted and extinguished precisely as an ordinary gas-jet. In many places where a supply of compressed air is available, this type of heater should also find a serviceable place. These various forms of heaters are plentifully illustrated in the firm's newly issued catalogue.

The will of the late Mr. Samuel Rigg, who was for many years Secretary of the Wigton Gas Company, and whose death was recorded in the "JOURNAL" for the 15th ult., has been proved at £45,715 gross.

SEMI-WATER-GAS PLANTS FOR POWER.

We have just received from Mr. ERNEST A. DOWSON, of Birmingham, a print of a paper (together with the discussion that took place upon it), entitled "The Use of Gas for Power and Heating," which he read earlier in the year before the Birmingham Association of Mechanical Engineers. After briefly enumerating the advantages incident to the use of gas power, Mr. Dowson proceeded to describe the properties and manufacture of those gases which lend themselves economically to industrial use on a large scale—namely, ordinary coal gas, coke-oven gas, air gas (hitherto generally known as Siemens or producer gas), blast-furnace gas, water gas, and finally semi-water gas. The following are the portions of the paper that will be of most general interest to "JOURNAL" readers.

Semi-water-gas may be said to be a combination of the previously described gases; and its very wide adoption shows it to be the most generally interesting from an industrial point of view. It would be out of keeping with the objects of the Association to fully review the early history of gas generators. Suffice it to say, therefore, that though several old systems give fairly good results in supplying gas to furnaces, it was not until the invention by Mr. J. Emerson Dowson of his complete plant for making cheap, clean gas for driving gas-engines, that the use of any special gas for engine work was attempted. Its introduction marked the commencement of a new era in the evolution of gas power. Up to this period, it had only been economical to use engines of very limited power; but gaseous fuel suitable for driving engines is now extremely cheap, and in point of size the big commercial gas-engine has almost reached that of its steam rival.

An important feature of the Dowson system, apart from the nature of the cleaning apparatus, consists in the blowing in of a continuous supply of air, mixed with superheated steam, through a specially designed injector or blower. The mixed steam and air pass into the closed ashpit of the gas-generator, and thence through the bed of incandescent fuel above, which is contained within the fire-brick lining of the generator. The resulting gases—chiefly hydrogen, carbonic oxide, and nitrogen—pass away from the upper part of the generator into the cleaning and balancing or storing apparatus. In some of the earlier installations, a kind of flash-tube water-vaporizer was used, which was fed with water direct from the town mains, though more generally the steam has been derived from a small superheating boiler. A typical volumetric analysis of Dowson semi-water gas may be given as follows: Hydrogen, 18·50 per cent.; carbon monoxide, 25·25 per cent.; marsh gas, 2·00 per cent.; carbon dioxide, 5·25 per cent.; nitrogen, 49·00 per cent. Its heating value is about 160 B.T.U. per cubic foot; while the inclusive cost of manufacture is from (say) 1½d. to 2½d. per 1000 cubic feet, varying according to the scale on which the gas is made. For developing power in an engine, about 70 cubic feet of gas are required for 1 brake horse power; and the gas needs, for complete combustion, rather more than an equal volume of air.

For making gas for driving engines, the best results have been obtained when the fuel is either small anthracite peas or ordinary gas coke; but latterly something has been done in the way of using ordinary hard, non-caking, bituminous coals, which in some districts are much cheaper than the former. It must, however, be remembered that a mere comparison of the prices of the raw fuels per ton does not constitute a complete basis from which to compute the relative costs of a brake-horse-power-hour obtained in any given cases. Fuels other than the two first mentioned have certain drawbacks, especially in plants of average size. The removal of the tar which is found in gas made from any bituminous fuel requires more extensive cleaning apparatus, part of which generally needs engine power to drive it; while the water consumption is increased for the same reason, in addition to which it is distinctly a dirty process. It is a mistake to suppose that any class of slack coal may be employed, even in large installations. All coalfields do not yield fuel which will give good results in gas-making. Bituminous coals are not of so uniform a quality as are those of the anthracite class; and they will always be more troublesome to deal with than are the latter. Some coals are very apt to "hang up" in the generators, which, besides causing trouble in working, inevitably leads to variations in the quality of the gas made. More labour is always involved in the gasification of bituminous fuels; and a certain element of risk is introduced of tar getting over to the engines on occasion. When this occurs, much trouble is experienced by the "gumming up" of the valves and other working parts, causing serious delay and loss. Various devices may be adopted for lessening the deposition of this tar. One of these consists in splitting up the tarry vapour into its volatile constituents by passing it through the hottest zone of the fire. This principle may be applied by working the generator downwards, an example of which is seen in the inverted generator of M. Deschamps. Another method is to bye-pass the raw gases, and circulate them through the whole depth of the fire before letting them go forward. Some ten years since, this process was applied in tests by the Dowson Company; and it has certain advantages where such fuel is used. All these arrangements are, however, somewhat complicated, which is an inadvisable feature in an ordinary factory plant. It is a fact that small and medium sized installations working with bituminous coal have been found to cause a great deal of trouble; and probably it is wise to look on this fuel as hardly suitable for such cases.

Provided one has sufficient scrubbers and washers, there is, however, no obstacle to the use of such bituminous fuel; and a notable instance of this is to be seen in the large plants arranged by Dr. Mond. The latter has also designed a very ingenious system for the recovery of sulphate of ammonia as a bye-product. This is effected mainly by working at specially low temperature, and subsequently washing the gas with a stream of dilute sulphuric acid. For working on a very large scale, this system has shown good results; but it is hardly applicable to the case of the average user, and it is necessary to select a fuel containing a fair percentage of nitrogen. It should be remembered that, not only is it advisable that any power plant should occupy as small a space as possible, but that its parts shall be free from complications, which inevitably call for skilled attention and increase the risk of stoppage. Apart from the recovery of ammonia, the actual process of gas making in this plant is similar to that employed in other systems. The heating value of the gas from these "recovery" plants is about 150 B.T.U. per cubic foot.

Modifications of the original type of Dowson gas plant have been introduced to meet the requirements of smaller users. One of these consists in making the necessary steam in the generator itself; the air being supplied, and the pressure being obtained, by using a power-driven fan or blower. This is applicable in many cases where space is limited, while it also reduces to a minimum the amount of attention needed with small plants. Again, some years since M. Benier experimented in France with a small Dowson gas plant, and eventually succeeded in arranging for the engine to draw its supply of gas from the apparatus by means of a pump, without the intervention of a gasholder. This gave somewhat uncertain results; but latterly the idea has again been brought prominently into notice, and the separate gas-pump has been eliminated. This type of plant has been brought to a high degree of perfection, as shown by the very high thermal efficiency realized. Mr. Dugald Clerk, in his "James Forrest" lecture before the Institution of Civil Engineers last year, stated that during a six hours' test a 40 brake horse power Dowson plant showed a working efficiency of 89 per cent. This must surely indicate that we are not very far from finality in this particular direction.

After describing a small plant of this type, Mr. Dowson continued: Many engineers have thought that the power obtained from an engine working with gas plant of the suction type would be much less than if the gas were supplied under pressure. This, however, is not the case; and an inspection of a batch of indicator cards taken from engines of various makes (the sizes varying from 30 to 100 horse power) shows in each case a mean pressure of from 80 to 90 lbs. per square inch. In discussing the point with users of these plants, the author has often changed the engine over from the normal working under pressure, to working by suction alone, without easing the load, notwithstanding which no change was noticed by those in charge. It is not always essential, on this system, that each gas-engine shall have a separate plant. Provided they are fairly close together, two or more engines may be coupled up to the same generator. It is, of course, necessary to consider their relative locations, and to design the connecting main services with care. This suction type of plant has been erected in conjunction with various makes of engine, both at home and abroad, to the extent of over 10,000-horse power, apart from any of those now supplied by Continental and other makers. For moderate powers—say, from 10 to 300 horse power—where no exceptional requirements have to be met, it offers many advantages. The fuel consumption is extremely low, as instanced by tests which have shown a figure as low as 0·8 lb. per brake horse power per hour of small anthracite of commercial quality, such as can be obtained in Birmingham at about 18s. per ton. The water required for gas making and cooling does not exceed about 6 pints per brake horse power per hour. Beyond this, an allowance for attendance must be made; and for a plant of (say) 100 brake horse power, the time required is about 2 hours daily for one man. The small space occupied is also an important feature; and this is, roughly, equal to about ½ square foot for each brake horse power capacity. Installations of this type of plant are at work where the power is utilized in driving dynamos, supplying current for both electric lighting and power; and the fact that the whole station costs have worked out at from about ½d. to ¾d. per unit, shows the really remarkable economy of the system.

As the most modern, the suction type of plant has naturally commanded much attention. At the some time, there are many cases where one or other of the alternative types should be adopted in preference. For special cases, and where gas is required to serve the double purpose of driving engines as well as for carrying out heating processes on a moderate scale, an apparatus of what may be called a "combined" type is often used. On this system, a portion of the gas is passed into a small gasholder to supply the blowpipes or burners, while the remainder is sucked away direct to the engines. This arrangement economizes space, and has other features to recommend it where various kinds of work are carried on. The particular type of gas-making plant to adopt in any given case can only be decided upon after a careful review of the special conditions under which it will work. There are usually quite a number of these conditions, each of which has an important bearing on the success of

the scheme. The most economical results can only be realized by treating each case on its merits and giving full weight to all local considerations. It is impossible to lay down any hard-and-fast rule as to what is best in all cases. Great confusion at present exists in the public mind as to the various gases and their uses. One has had frequently to explain that the terms "producer gas," "suction gas," and "pressure gas" are purely arbitrary, as the gases employed in the three cases may even be identical in composition. All gases made in modern power plants are of the semi-water class, and whether the steam and air are forced through the fuel by the pressure of the atmosphere, or whether the pressure is set up by a special blower, makes but little difference to the gas evolved.

In order to illustrate the economy effected by the use of semi-water-gas plants, it will be useful to set out the comparative running costs for power installations of 25 and 100 brake horse power respectively, working on several well-known systems. These figures cover a year's working, and are based on fifty working weeks of 54 hours each. For convenience, I have only taken the items which may be called "variables." The following are the systems compared: (*a*) Electric motor, taking current from public mains at 1d. per Board of Trade unit. (*b*) High-speed compound non-condensing steam-engine and Lancashire boiler, working with steam coal at 12s. per ton. (*c*) Gas-engine, working on coal gas at 2s. per 1000 cubic feet. (*d*) Gas-engine, working on Dowson semi-water gas, the raw fuel costing 20s. per ton.

Annual Cost of Running Power Plants.

	25 Brake Horse Power. £ s. d.	100 Brake Horse Power. £ s. d.
(A). Electric motor, taking current at 1d. per Board of Trade unit.		
Current, allowing ⅔ unit to develop each B.H.P.	205 0 0	820 0 0
Interest, depreciation, &c., at 7½ per cent.	4 10 0	11 5 0
Total	£209 10 0	£831 5 0
(B). High-speed steam-engine, with Lancashire boiler.		
Coal: 5 lbs. and 4 lbs. per B.H.P. per hour, respectively, at 12s. per ton	90 8 0	289 5 0
Water: 4 gallons per B.H.P. per hour at 9d. per 1000 gallons	10 2 0	40 0 0
Labour, at 15s. and 27s. per week, respectively	37 10 0	67 10 0
Interest, depreciation, &c., at 10 per cent.	35 0 0	100 0 0
Total	£173 0 0	£496 15 0
C). Gas-engine on coal gas at 2s. per 1000 cubic feet.		
Gas, at 17 cubic feet and 15 cubic feet per B.H.P., respectively	114 15 0	405 0 0
Labour, 1 hour per day, at 6d.	7 10 0	7 10 0
Interest, depreciation, &c., at 10 per cent.	16 0 0	50 0 0
Total	£138 5 0	£462 10 0
(D). Gas-engine on semi-water gas.		
Coal: 1 lb. per B.H.P. per hour at 20s. per ton	30 0 0	120 0 0
Water: ⅔ gallons per B.H.P. per hour at 9d. per 1000 gallons	2 0 0	8 0 0
Labour, at one-third of Case B.	12 10 0	22 10 0
Interest, depreciation, &c., at 10 per cent.	25 0 0	65 0 0
Total	£69 10 0	£215 10 0

From this table of working costs, it is clear that the combination of gas-engine and plant, taken in Case D, forms by far the most economical installation to use. In fact, the difference is so great that, even where power is only called for during (say) three consecutive hours each day, it will generally be worth while to adopt the system. With the exception of wind and water power, which are seldom available, there is no other way of realizing similar results.

Mr. Dowson afterwards described some examples of the various types of gas-engines in use; and he concluded his paper with some remarks on the application of gaseous fuel to heating work.

GAS-ENGINES FOR LARGE VESSELS.

On the subject of the use of gas-engines for marine purposes, the "Glasgow Herald" says: "It is significant of the progressive attitude of the technical officers of the Admiralty—especially in the engineering branch—that they decided to apply experimental gas-engines with producers instead of steam-engines and boilers for the propulsion of large vessels, before any shipowner was found with courage to essay a departure, though experience in land stations promises most economical results. An installation now being constructed at Manchester will be applied by the Admiralty; and as the power to be developed is 500 brake horse power, it will be recognized that the test is to be on a thoroughly practical and searching scale. While thus giving credit to the Admiralty, it is but fair to make mention of the splendid pioneer work carried out, and being continued, by Mr. William Beardmore, of Glasgow, in this respect, alike for marine and for land work. It is now some years since Mr. Beardmore took up the work, acquiring the British rights in the Oechelhaeuser engine, one of the simplest and most popular of the Continental designs. The success of the application of this horizontal engine, several of which are now in use in the West of Scotlond, led him to investigate fully the adaptability of the system to marine work; and now there is being built a 500 and a 1000 horse power installation for ships, and these may be ready for use before the Admiralty set. An effort is to be made to use the cheapest bituminous coal for the generation of the gas for the engines; and there seems every chance of success, with a satisfactory method of purifying the gas to prevent the clogging of valves, &c. Should this be realized, and the consumption come out under 1 lb. per horse power per hour, the coal bill will be halved, and at the same time more room will be made available for cargo by the reduction of the size of engine-rooms, boiler stokeholes, and coal bunkers.

FRICTION IN PIPE BENDS.

One of the most practical papers contained in recent volumes of the Proceedings of the Institution of Civil Engineers (says the "Builder") describes the investigation made by Mr. C. W. L. Alexander at the University of Birmingham as to the resistance offered by pipe bends and elbows to the flow of water. For the purpose of these experiments, the bends and elbows were made of pine, carefully varnished with shellac, and rubbed down very smooth with glass paper. A length of straight pipe was also prepared for comparison of the results. The object of the experiments being to determine the loss of head for different degrees of curvature at different velocities, the curve of loss for a straight pipe was first ascertained per unit length. Then a table was prepared showing the loss of head, at various velocities, for a length of straight pipe equal to the length of the centre line of the different bends and elbows tested. When the losses for these had been obtained and plotted, the exact effect of each was clearly seen. It appears that the loss of head at a bend follows the same laws as those governing the loss in a straight pipe; and the obstruction does not cause anything in the nature of a shock until the bend assumes the form of a sharp elbow. For the formulæ derived by the author, we must refer our readers to the paper itself, but may mention two interesting practical points. The first is that the curve offering the least resistance is one with a radius of 2½ diameters; and the second that the resistance of such a bend is 3·38 times the resistance of an equal length of straight pipe.

RELATIVE COST OF GAS FOR MOTIVE POWER.

According to the current issue of the "Electrical Review," a paper read before the Canadian Society of Civil Engineers recently contains some useful information upon the cost of generating power by means of coal, by producer, water, and semi-water gas, and by gasolene, or, as it is better known in this country, petrol. The results obtained from a number of engines, running ten hours a day for 312 days in the year, are as follows: Petrol—The consumption of petrol is one-eighth of a gallon per brake-horse-power-hour; and at 10d. a gallon the cost per brake-horse-power per annum is 325s. Coal gas—With a gas-engine of modern construction, taking 15 cubic feet per hour per brake-horse-power, the cost per annum per brake-horse-power, with gas at 4s. 2d. per 1000 cubic feet, would be 195s. Semi-water gas from anthracite—With anthracite at 20s. 10d. per ton, and the engine and producer working at 1 lb. of anthracite to produce 1 brake-horse-power-hour, the annual cost of 1 brake-horse-power would be 32s. 6d. Semi-water gas from gas-coke—With an 80-horse power plant on test, the consumption of common gas-coke was 0·92 lb. per brake-horse-power-hour; and with coke at 16s. 8d. per ton, the cost per annum of 1 brake-horse-power would be 24s. Water-gas from bituminous coal—With reasonably large engines, 1 brake-horse-power-hour requires 8 lbs., which at 16s. 4d. per ton would show a cost of 20s. 10d. per annum per brake-horse-power. Of course, with fuel at other prices these costs would vary; but the author makes out a very good case for gas-driven sets when producer gas is used, and gives an interesting curve connecting relative power obtained from various qualities of gas, referred to semi-water gas having 150 B.T.U. per cubic foot as a standard.

A Reinforced Concrete Reservoir.—An interesting account of a reinforced concrete reservoir for filtered water, completed last year at Tucuman, Argentina, is given by Mr. Carlos Wanters in "El Cemento Armado en la Republica Argentina." It is a covered circular basin 118 feet in diameter and 17 feet high to the tops of the columns and wall. The wall is 8 inches thick, and the columns are 10 inches square, heavily reinforced and bevelled at the corners. There are 24 columns arranged round the circumference of a circle 74 feet in diameter, and 12 on the circumference of one 30 feet in diameter. The columns of each circumference support an annular reinforced concrete girder, and these two rings, with the outer wall, carry the annular vaults forming the roof.

MISCELLANEOUS NEWS.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

A Decreased Sale at Dover.

The profit earned by the Dover Gas Company during the past half year was sufficient to allow of the payment of the parliamentary dividend, and leave a surplus of £268. In moving the adoption of the Directors' report at the meeting last week, the Chairman, Mr. Willsher Mannering, said there had been a decrease of 4·67 per cent. in the sales of gas as compared with the corresponding period of the previous year; but the number of consumers had grown by 188. The decrease might be attributable to several causes—such as the mild weather, bad trade, the more general adoption of incandescent lighting, and the competition of electricity. Nevertheless, the balance of revenue carried to profit and loss account was £4239, or within £20 of the corresponding period. There was a total decrease in revenue of £1132; while the expenditure was £112 less. The net result of the working was a profit of £3830. A sum of £3000 had been written off capital account for depreciation of the Trevanion Street holder, only the upper lift of which remained serviceable. For the first time since the June half of 1899, the balance-sheet showed a credit at the bank. The overdraft had been gradually extinguished by the issue of stock; and the Board were now able to present a clean slate. The report was adopted; and the proceedings closed with votes of thanks to the Chairman, the Directors, the Secretary (Mr. G. Fielding), the Engineer (Mr. R. Herring), and the staff. Mr. Fielding, in acknowledging the compliment, mentioned that he was now in the fiftieth year of his service to the Company; having been their Solicitor for several years before becoming Secretary.

Increased Rental with Lower Price at Enfield.

Presiding at the half-yearly general meeting of the Enfield Gas Company on the 31st ult., Dr. J. Collyer (who referred to the regretted absence of the Chairman, Colonel Sir Alfred Somerset, K.C.B.) drew attention to the capital account—showing that out of £7221 expended during the half year, £6741 had been required for the laying of new mains and services and for the providing and fixing of additional meters and cookers. The new mains included 1640 yards of 14 inch, to reinforce the supply to the Enfield Town district, and 85 yards of similar size, the commencement of another extension to increase the supply to the Enfield Wash district. The increase of 9 per cent. in the sales of gas he considered very satisfactory, as in the corresponding period of the previous year, with which the comparison was made, the increase had been at the rate of 13·42 per cent. Mr. Alfred Ford seconded the motion, and pointed out that the gas-rental was £395 more than in the June half of 1904, though the price of gas to private consumers was 2d. per 1000 cubic feet less, and rebates had been made this year to all large consumers which together amounted to nearly £600. The number of meters and cookers had grown since the corresponding period at the rates of 33·19 and 66·93 per cent. respectively; so those rentals and the fittings rentals had increased by £407. Coke and tar, owing to depreciated prices, had not returned so much by £197; but sulphate of ammonia, in consequence of a better make per ton of coal and a more favourable market, added to the product obtained from the additional 426 tons of coal used, had gained by £143. On the debtor side of the revenue account the only item calling for particular comment was that of £1000 charged under the heading of prepayment meter supply fittings. It had hitherto been the custom of the Board to charge all the expenditure for supplying and fixing fittings in houses where slot meters were used directly against revenue account in the current half year in which it was made. The demand for supplies under this system had, however, reached such comparatively large proportions during the past half year that writing off to this extent could not be continued; and so out of the £1473 spent in the half year for this purpose, £1000 had been charged to revenue and the remaining £473 had been treated as a suspense account. The make of gas had averaged 11,515 cubic feet per ton of coal. A dividend at the rate of 5 per cent. per annum on the consolidated preference stock and 5½ per cent. per annum on the consolidated ordinary stock, less income-tax, was declared; and the meeting closed with complimentary votes to the Chairman and Directors and to the Secretary and General Manager (Mr. C. W. Offord) and staff. The gross profit, after deducting interest charges, amounted to £3756, of which the dividend declared will absorb £3367, leaving £389 to swell the undivided profit to a total of £3527. During the half year the number of consumers increased by 772 to 5597, of which total 3740 use prepayment meters. There are 3751 cookers in use, an increase of 827 in the half year. Of the 148,282,000 cubic feet of gas sold during the year to June, 1905, 67·34 per cent. was taken by ordinary consumers, 24·18 per cent. by prepayment meter users, and 8·48 per cent. by the public lamps, which now number 822. The Company supply 58½ per cent. of the inhabited houses in their area; whereas ten years ago they supplied only 19 per cent. Meantime, the inhabited houses have increased by 48½ per cent.; and the number supplied with gas by 359 per cent. In 1895, there were 43·15 consumers per mile of main, while now they are 115·40; and the capital employed per million cubic feet of gas sold has decreased in the same period by £408 18s. 4d.

Stoking Machinery at Farnworth.

The Directors' report and balance-sheet submitted at the half-yearly meeting of the Farnworth and Kersley Gas Company showed that as the result of the working for the six months to June 30 there was a surplus of £663, after charging all the expenditure incurred in some important alterations in the retort-house; and it was proposed to withdraw from the reserve fund—amounting to £15,880—a sum of £1475 required to make up maximum dividends. The receipts on revenue account during the six months were £10,093, and the expenditure £9430. There was an increase of 3 per cent. in the sales of gas; and a good demand has been experienced for cookers, grillers, and other appliances. In moving the adoption of the report and financial statement, the Chairman (Mr. James Fletcher) referred in congratulatory terms to the satisfactory working of their undertaking during the half year. Notwithstanding the competition of electric lighting, the increased use of incandescent burners, and the prolonged mild weather, there was a notable increase in the sale of gas; and the consumers now numbered 6990, against 6704 last year. The new arrangement for facilitating the production of gas by the introduction of the De Brouwer stoking machinery, and a great improvement on the open-firing system, were now practically completed, and would shortly be in full operation, with the result that the cost of manufacturing would be reduced. The report was adopted; and the customary dividends at the rate of 10 per cent. per annum on the "A" stock, and 7 per cent on the "B" stock and "D" shares were declared. A vote of thanks to the Chairman and Directors, the Manager (Mr. H. Pickford), and the Secretary (Mr. W. Bromley) concluded the meeting. Subsequently the shareholders made an inspection of the new system of stoking, which was acknowledged to operate very satisfactorily.

A Prospective Reduction in Price at Hastings.

In their report to the shareholders on the half-year's working to June 30 (which, under the circumstances, they considered satisfactory), the Directors of the Hastings and St. Leonards Gas Company stated that the exceptionally fine and mild weather, and the rapid increase in the use of incandescent gas-burners, had somewhat affected the business; and there had been a continued depreciation in the value of coke, tar, and ammonia. The plant at the new works at Glyne Gap was being completed, ready for use during the ensuing winter. The accounts showed a balance of £11,772; and the statutory sliding-scale dividends were recommended. In moving the adoption of the report and the declaration of the dividend at the meeting last Thursday, the Chairman, Dr. G. G. Gray, J.P., said the profit balance was within £83 of that for the corresponding period of last year—that was, it was sufficient, after meeting all the outgoings, to pay the full statutory dividends and leave a balance to carry forward. The Directors hoped that another year would see them safely transferred to Glyne Gap; and if they could continue without having to resort to their floating balance, they would have carried out more than they ventured to hope when they undertook the considerable task of establishing the new works. Though the balance was practically the same as in the corresponding half year, it was made up very differently. There had been a considerable decrease in receipts; but this was nearly equalled by the decrease in the expenditure. There had been a falling off of nearly 8 million cubic feet in the amount of gas sold, which meant a decrease of £1209. This occurred during the first three months of the year—mostly in February, which was exceptionally fine and mild, in addition to which the month had one day less than the previous year. Decrease in residuals amounted to £2631, of which coke was responsible for £2299, tar for £243, and ammoniacal liquor for £149. These decreases were due to depression in various trades and the constant glut in the market; but so far from being exceptional in Hastings, in other places the depression had been so much more acute that they had paid carriage and sent coke into Hastings, and undersold the Gas Company. The total net decrease in the receipts for the half year, as compared with the corresponding six months, amounted to £3744. On the expenditure side, they would find a decrease in the amount paid for fuel and duty, amounting to £2908, and a decrease of £354 in wages. Those were due in part to reduced manufacture consequent on the smaller sale, and also in part to the amount of gas manufactured at Glyne Gap at a reduced cost with regard to wages—and, of course, exempt from coal dues. There had been a net decrease of £949 with regard to repairs, and a total decrease of £3661 in expenditure. The decrease in receipts was not due to depreciation of business. There had been an increase of 152 in the number of stoves and 235 meters, which meant more consumers. Though incandescent burners represented the saving of a large percentage to gas consumers, the rapid increase in their use was a very healthy sign. The various alterations at Glyne Gap had practically been completed; and the works would shortly be in a position for the Company to commence manufacturing there in earnest. At least early next year the Company would be able to manufacture the greater portion, if not the whole, of the gas at the new works. In consequence, the standard price of gas would be reduced from 4s. per 1000 cubic feet to 3s. 10½d. They had the alternative either to reduce the dividend next year by 3s. 9d. per cent. or 2s. 7½d. per cent., or to reduce the price of gas by 1½d. and retain the dividend as at present. The Directors had decided to reduce the price of gas by 1½d., so that the stockholders would in future receive the same dividend as heretofore, and the consumers would get their gas at 2s. 10½d. instead of 3s. per 1000 cubic feet, which should give an impetus to the consumption. If in future they made the saving at Glyne Gap which they anticipated, it would be a pleasure to be able to declare a further reduction in price. Through reduction in the cost of maintenance of mantles, chimneys, &c., used on the public lamps, a saving to the ratepayers of about £200 per annum had been made. The report was unanimously adopted.

A Record Dividend at Keswick.

For the first time in their history, the Keswick Gas Company, at the annual meeting last Tuesday, declared a dividend of 10 per cent. on the original capital, and 7 per cent. on the additional capital. The consumption of gas is now close upon 18 million cubic feet per annum. The report stated that, after allowing for depreciation of cookers and bad debts, the revenue account showed a credit balance of £1309 on the year's working to June 30. After additions and deductions on account of interest, &c., there remained £1174, out of which the Directors recommended the payment of the dividends named. This would absorb £995, and leave £179 to be added to the profit and loss (net revenue) account. During the year the Directors put into force the 38th section of the Company's Act, and allowed a rebate to consumers, of 5 per cent. each half year in consideration of prompt payment of their accounts.

Continued Progress at Southend.

The report submitted at the recent half-yearly meeting of the Southend Gas Company stated that the accounts for the six months to June 30 showed a continued growth in the sale of gas—the increased quantity over the corresponding period of last year being 8,490,700 cubic feet, equalling 8 91 per cent. The consumers had increased by 926, of which 691 were automatic. The profit and loss account showed a net amount available for dividend of £8364; and the Directors recommended the payment of dividends at the rate of 5¾ per cent. on the original consolidated and new ordinary stocks, and 5⅝ per cent. per annum on the new ordinary "B" stock (all less income-tax). This would absorb £4851, leaving £3513 to be carried to the next half year. The Chairman (Mr. C. F. Woosnam), in moving the adoption of the report, said that 1025 cooking-stoves had been fixed during the half year, while 1865 yards of mains had been laid. In manufacture, £1000 more had been spent; but 8½ million cubic feet more gas had been sold, while the reduction of 2d. per 1000 cubic feet had been withstood, and they had actually received £662 more for gas sold. On the credit side, they had done better under every head except two—and that was only a matter of £21. To sum up, they had a balance to their credit on the half-year's working of £6578, which, added to the balance brought forward, would enable them to pay the dividends recommended, and, as stated in the report, leave £3513 to carry to the next account. The report was adopted; and votes of thanks were accorded to the Chairman and Directors, the Engineer (Mr. F. Clark), the Secretary (Mr. J. T. Randall), and the staff.

An Increased Income at Sunderland.

The total revenue of the Sunderland Gas Company for the year ending June 30 was £119,638, and the expenditure £100,857, leaving a balance of £18,781 for the twelve months. Presiding at the annual meeting, Mr. G. R. Booth said that, under these circumstances, they could still hope for the maximum amount of dividend as before. The income continued to grow; the amount of the increase during the past year having been £1250. Of the total revenue £84,523 was derived directly from gas, and £35,062 from residual products. They had considerably added to their business by the introduction of slot meters—4460 were fixed last year—which promised to further increase in the future, as they had as many applications for these meters as it was possible to deal with. The Company were in a prosperous condition, and did not fear any competition. The report was adopted, and dividends of 5 per cent. on the original stock and 4¾ per cent. on the additional capital stock, less income-tax, were declared.

Lower Price and Larger Consumption at Tonbridge.

Presiding at the recent half-yearly meeting of the Tonbridge Gas Company, Mr. W. Judd said that the past six months had been very prosperous. At the beginning of the year, the price of gas had been reduced from 3s. to 2s. 10d. per 1000 cubic feet, which, considering the size and position of the town, compared very favourably with other places in the district. By reducing the price of gas, they were enabled to benefit the shareholders by dividing another ½ per cent. The profit for the half year was £2498. They had several adverse circumstances to contend with—for one thing, the market for residual products was very depressed. The new retort-settings had, however, resulted in a large saving of coke. The work of telescoping the gasholder was now nearly completed; and when finished, the storage capacity would be increased from 261,000 to 400,000 cubic feet. During the past ten years the business of the Company had increased very much. For the year ending June, 1895, the quantity of gas made was 37 million cubic feet, whereas it was now 86 millions; and the capital had risen from £33,000 to £54,000. The price of gas had been reduced from 3s. 6d. to 2s. 10d. per 1000 cubic feet. A reduction of 2d. per 1000 feet meant a loss of income of about £650 per annum; and the saving to the consumers by the reductions amounted to £2700 per annum on the basis of this year's consumption. The consumption of gas continued to increase steadily. The report was adopted; Mr. Catt, who seconded the motion, remarking that the Directors and the Secretary and Manager (Mr. J. Donaldson) were to be congratulated upon it. The dividends declared were at the rate of 12, 9, and 5 per cent. per annum.

A Slightly Decreased Consumption at Waterford.

Presiding at the annual meeting of the City of Waterford Gas Company, Mr. George Lynch stated that the quantity of gas sold had not been quite so large as in the preceding year. This had been the case with many other companies, including the large London ones; and it was chiefly attributable to the greatly increased number of incandescent lights, which gave a better illumination with a smaller consumption of gas. They proposed to pay a dividend which, with the interim distribution, would make the full statutory dividend of 6¼ per cent. for the year; and after payment of this, there would remain a balance to carry forward of £2035. This was required to pay part of the cost of a new gasholder which they were about to order; the two old ones being so worn out that it would not be prudent to spend any more money in repairing them. When this was erected, the works and mains would be in so complete a state as not to require for a long time any outlay except the ordinary repairs and renewals incidental to every gas undertaking. The report was adopted, and the proceedings closed with a vote of thanks to the Chairman and Directors, the Engineer and General Manager (Mr. R. Bruce Anderson), and the other officers of the Company.

Water.

New Source of Supply at Gosport.

Mr. W. E. Churcher, in moving at the half-yearly meeting of the Gosport Water Company the adoption of the Directors' report (which showed that the income for the six months was £4314), said the revenue was the largest they had ever had in the June half of the year. The expenditure permitted the sum of £2432 to be carried to the profit and loss account, bringing the balance up to £5696, after providing for all liabilities. The Board therefore recommended the payment of the full statutory dividends. The most interesting paragraph in the report was that which referred to the new water scheme at Soberton; and they were assured that, notwithstanding unlooked for delays, the Contractor was now making good progress towards completion. The water yield from the incomplete well-shaft had exceeded expectations; and the success of the new source of supply was assured. The Directors, therefore, proposed to proceed with the laying of the new pumping and gravitation mains; and the contracts for the buildings, reservoir, and other works would follow with all reasonable dispatch. At an early date a further issue of £20,000 of preference stock would be made to meet the expenditure. They had had an analysis made of the water obtained at the new source; and it was certified to be chalk water of pure quality, fit for all domestic purposes. The report was adopted, and the dividends recommended were declared.

HARROW AND STANMORE GAS COMPANY.

A Question of Capital and of Rates.

The Half-Yearly Meeting of this Company was held yesterday week, at the Albion Tavern, Aldersgate Street, E.C.—Mr. A. H. Baynes in the chair.

The Engineer and Secretary (Mr. J. L. Chapman), read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The Chairman said he was happy to think there was no necessity for any lengthened remarks. He thought, if the shareholders carefully examined the report, they would feel thoroughly satisfied with it. The only drawback in it—and that was in common with all other gas companies—was the decline in the price of coke, which had decreased their receipts from residuals by £466. But in the other items of receipt they showed an increase all round. There was an increase in the gas-rental, as compared with the corresponding period of last year, of £217; and this, notwithstanding a reduction in the price of gas over the whole district. Then the sale of gas had increased by more than 4¾ per cent. The make of gas had been 11,000 cubic feet per ton of coal carbonized; and the sale had been upwards of 10,200 cubic feet per ton. During the half year, gas had been laid on to 170 new ordinary consumers, and 360 new prepayment customers. Meter, stove, and fittings rentals had increased by 25 per cent. The coke made had been equal to 12¼ cwt. per ton of coal carbonized. As to cooking-stoves, there had been an increased demand, and the Company had now 1700 on hire. The total length of gas-mains at present was about 68 miles, with an average of 50 consumers per mile. The net profit for the half year, after deducting £539 for interest on loans and mortgages, amounted to £4017. The dividends recommended in the report would take £3935; leaving a balance of £81 to be added to the previous balance of £2620, and making a total of £2701 to be carried forward. This condition of affairs was, he thought, all things considered, satisfactory; and it reflected much credit on their Engineer. Feeling that, on the whole, it was so satisfactory, he moved the adoption of the report.

Mr. A. F. Phillips seconded the motion, which was unanimously carried.

Mr. Daniel Hill said he was sorry to see the capital was still going up. The capital account now stood at the "awful" amount (if he might use the term) of £1250 per million cubic feet of gas made. This was an exceedingly high figure; and he saw that £2461 had been added to the account in the past year for new meters and stoves alone. They had about 500 new consumers; and the meters and stoves for these had cost capital that £2461. Then there was the matter of depreciation. It seemed to him the Directors did not write off enough for the depreciation of meters and stoves; he could not help fancying it was a small amount. However, they must expect to see a great deal of new gas rental next year on the big outlay of capital. So far as he could make out, the figures for renewals and depreciation of meters, &c., only worked out to about 1½d. per 1000 cubic feet of gas made; and this was only about 4 per cent., which gave a life for the meters of 25 years. This he considered was rather too long; and he thought that some of their friends on the directorate would agree with him. It also seemed to him a terrible thing that this year they should have had to pay £1318 in rates and taxes, which was equal to about 3d. per 1000 cubic feet of gas made. He could not help thinking that the piling up of the capital had a great deal to do with the increase of the rates. If the Directors could see their way to take from capital account quite £1000 of the charge for additional stoves and meters, and put it to revenue, they would stand a great deal better chance with the rating authorities. This seemed to him to be one of the things which ought to be looked into. He was also curious as to why, with a carburetted water gas plant, the Directors went in for such an expensive coal. It worked out to 19s. 3d. per ton; and, with a carburetted water gas plant, in his opinion the Company were paying a very high price for their coal. But he did wish to impress upon the Directors the question of the constant loading up of capital by putting so much to it. There had been £13,000 added in the past year; and there was also an overdraft at the bank of £3200, and a temporary loan of £1500.

The Chairman remarked that the Board were much obliged to Mr. Hill for calling attention to two or three matters. They did not deny that the capital was high. It had been a difficulty from the beginning. There was another consideration. In the Company's district, they had had a great many new roads opened with the prospect of building; and the Directors had taken advantage of this, and laid pipes in them. He quite anticipated from this expenditure an improved rental. With Mr. Hill he agreed that the question of rating was a serious one; and it not only hampered this Company, but a great many other Companies. Mr. Hill could not have read the accounts of the railway company meetings lately without seeing that they also were beginning to find the rates so burdensome that something would have to be done. These matters were not new to the Directors. They were doing their very best under the circumstances; and he did not deny that they were heavily capitalized.

The motion was unanimously carried.

Proposed by the Chairman, and seconded by Mr. Horace J. Rydon, dividends were declared at the rates per annum of 9¾ per cent. on the

"A" capital, 7 per cent. on the additional "B" capital, and £6 16s. 6d. on the "C" capital and guaranteed shares, all less income-tax.

Mr. A. F. PHILLIPS moved a vote of thanks to the Engineer and Secretary, and his staff and workmen, all of whom he said had ably served the company during the past half year. They had, he continued, been making alterations and additions to the works during the last two years. This had necessitated a very considerable rearrangement of the plant; and he knew from the visits he had paid to the works, the great attention that Mr. Chapman had given to it. It was through his attention that he (Mr. Phillips) was glad to say the alterations were now practically speaking completed. There was no doubt Mr. Hill had "spotted" their weakness when he mentioned the heavy capital. This was a burden, he was sure, over which they would all sympathize with their Engineer. He had to contend with it; and he was not able to charge to revenue so much as other companies whose revenue was much smaller. If they would turn to the accounts, it would be found that for the past half year the amount charged to revenue for repairs and renewals was equivalent to 4s. 6d. per ton of coal. Now, for Harrow, he (Mr. Phillips) thought this was very satisfactory. In regard to the rates they all felt the burden; and the Directors had endeavoured to get them reduced. It was one of the inequalities of the rating of gas-works that, if they had a large capital and had to charge a high price for gas, and consequently derived a greater net profit, the rates went up at the same time. In fact, they were assessed on the profit that the undertaking earned. This was the reason why a small works charging a high price for gas paid in rates more per 1000 cubic feet than another works of larger size, selling a greater quantity of gas at a lower price.

Mr. HILL heartily seconded the motion, and the CHAIRMAN supported it with the remark that their Engineer served the Company with great fidelity.

Mr. CHAPMAN, in the course of his acknowledgment, said he must say that he was very much indebted to his staff; and he thought the workmen were also doing their very best for the Company. With regard to the latter, the Directors took great interest in them; and those who had been in the Company's service two years had a week's holiday and ten days' pay. This he thought redounded very much to the benefit of the Company. In a reference to the Auditors, he mentioned that Mr. Randall had held one of the auditorships for 33 years.

Mr. SAMUEL CUTLER moved a vote of thanks to the Chairman and Directors; and Mr. A. W. OKE seconded, with the remark that he did not share in the gloomy views that had been expressed by one of the shareholders. He (Mr. Oke) looked upon the shares of the Company as rather gilt-edged. They were much sought after in the market; and though the capital account was overdrawn, he ventured to prophesy that, when next shares were placed on the market, they would obtain record prices.

The motion was cordially agreed to; and the CHAIRMAN's response ended the proceedings.

ADVERTISING A GAS LIGHTING CONTRACT.

A Moot Question "Settled."

A correspondent of the "Municipal Journal" wrote to ask whether it is compulsory for an Urban District Council to advertise for tenders for supplying their town with "gas light," when in the town the mains are owned by a private company and the latter are the only people who can supply the need, having no electric light in competition? For three consecutive weeks, says "Inquisitive," this farce has been advertised. A "Barrister" replies: The Public Health Act, 1875, section 174, provides (*inter alia*) that, before any contract of the value or amount of £100 or upwards is entered into by an urban authority, ten days' public notice at the least shall be given, expressing the nature and purpose thereof, and inviting tenders for the execution of the same. Under section 161 of the same Act, any urban authority "may contract with any person for the supply of gas" for lighting the streets and public buildings of the district. Perhaps a strict construction of the provision of section 174 as to tenders may, he says, lead to the conclusion that it is necessary to give public notice that tenders are required for gas supply in the district; and though no tender other than that of the local company is likely to be received, it may have been considered in the present case that there was some advantage in giving publicity in the manner indicated to the intentions of the Council. The provisions referred to were not, however, in his opinion, intended to be applied to a case such as the present; and where there is only one local gas company (as appears to be the case here), and the required supply cannot be obtained elsewhere, it seems that "the authority would have been within its rights in omitting to advertise for tenders for the gas supply."

THE LIABILITIES OF A GAS COMPANY.

[From "Engineering."]

The serious liabilities to which gas companies are exposed when gas escapes from their mains, were well illustrated by a case which came before Mr. Justice Darling and a Special Jury not long since.* A telephone-box under the pavement in Regent Street became filled with an explosive mixture of gas and air. The gas came from the mains of the Gaslight and Coke Company. By the carelessness of an official of the Post Office, who was using a naked light while repairing certain telephone wires, the box was exploded, and serious injuries were done to the plaintiff, who happened to be passing. In an action for damages, the Jury were told that if the defendants were guilty of negligence, which caused the accident, they should be held liable. It had been proved, however, that it was exceedingly difficult to prevent a certain amount of leakage from street-mains, the joints of which became loosened by the vibration caused by passing traffic. In spite of this, the Jury found that there was negligence, and awarded damages to the plaintiff.

This decision appears to be somewhat extraordinary, having regard to the fact that the explosive mixture was set alight, not by any negligence on the part of the Gas Company's servants, but by a servant of the General Post Office. It practically places upon a gas company the entire responsibility for any explosion which may take place as the result of gas escaping from their mains. Further, it does not seem to accord with some of the older cases. Thus, in *Blenkiron v. Great Central Gas Consumers' Company* (1860), in an action against a gas company for negligently allowing the escape of gas from their main into premises where lights were known to be burning—the case for the plaintiff being that the gas found entrance through an open window nearly level with the trench from the main, after a hole had been made for the insertion of the service-pipe—it was held that even if the Jury thought the gas so entered, it was still a question for them whether defendants' men might reasonably have foreseen it, and were bound to have the window closed. Defendants' had a verdict.

At the same time, the fact that a gas company neglects to superintend works which are likely to injure gas-pipes may make them responsible. In the case of *Price v. South Metropolitan Gas Company* (1895) it appeared that, owing to excavations made by the Commissioners of Sewers within 2½ ft. of a gas-main embedded in a highway at a depth of 10½ inches, one of the gas-pipes was deprived of support from beneath. The weight of traffic above cracked the pipe, and an escape and accumulation of gas occurred for two or three days, resulting in an explosion which injured a man passing. The Gas Company were unaware of the escape of gas, as well as of the excavation, of which they had received no notice. It was held that the character of the crack in the pipe, the length of time the gas was escaping, and the absence of anyone on behalf of the Gas Company at the time of the excavation, constituted evidence of negligence on their part.

In the case of *Burrows v. March Gas and Coke Company* (1872), the defendants—a gas company—contracted to supply the plaintiff with a proper service-pipe to convey gas from the main outside to a meter inside his premises. Gas escaped from the pipe laid down under the contract into the plaintiff's shop. The servant of a gas-fitter employed by the plaintiff happened to be at work in another room at the time of the escape, and went into the shop upon hearing of it, with a view of finding out its cause. He was carrying a lighted candle in his hand; and immediately on entering the shop an explosion took place, doing damage to the plaintiff's stock and premises. On the trial of an action against the defendants for their breach of contract in not supplying a proper service-pipe, the jury found: First, that the escape of gas was occasioned by a defect in the pipe, and that the defect existed in the pipe when supplied; and, secondly, that there was negligence on the part of the gas-fitter's servant in carrying a lighted candle. Upon these findings, it was held—affirming the judgment of the Court below—that plaintiff was entitled to recover, and defendants were not relieved from liability by the negligent act of the gas-fitter's servant.

* See "JOURNAL" for March 21, p. 786.

Alleged Defective Gas-Mains at Hessle.—Correspondence has been taking place between the Hessle Urban District Council and the Gas Company with reference to a nuisance alleged to have arisen through an escape of gas from the mains. The Company maintained that the smells were caused by sewer gas, and not by coal gas; but, on the other hand, it was stated that since the complaints had been made, in almost every place pointed out, an escape from the Company's mains had been found. A piece of corroded pipe taken from the road where repairs were being executed has been submitted for inspection by the Council; the gentleman who exhibited it stating that he had no doubt there were hundreds of feet in a like condition lying buried beneath the roads of Hessle, and that the smell caused by the gas leaking from such pipes was injurious to the health of the inhabitants.

Local Government Board and Loan Periods.—On the subject of the periods for which water loans are granted by the Local Government Board, the following remarks are made by the "Local Government Journal." "Water engineers—and for that matter chairmen of water committees—will be interested in learning of the fate which befel the Paignton Council, when they sought to borrow £41,000 for thirty years, in order to complete the water-works. The first part of the original loan was borrowed (with consent, of course) for sixty years. The Paignton people wanted similar terms for the £41,000; but the Local Government Board have sternly refused, and have cut the term down to thirty years. This should be noted. It is plain we have lived out the folly of the long loan, which meant £2 paid for every £1 borrowed; and though the present policy will hurt a bit for a time, it will do great good in the end."

Hoylake and West Kirby Gas and Water Company, Limited.—It is the intention of the Hoylake and West Kirby Gas and Water Company, Limited, as funds permit, to pay off the deficiencies that have occurred in the maximum dividends of previous years as regards the water undertaking; and the first distribution on this account is to be made next week. The water share capital "A" and "B" is entitled to rank for dividend up to 10 and 7 per cent. respectively; and for the year ending June 30, 1899, and each year since, these rates have been paid. Previous to that date, however, there were deficiencies. The first dividend paid by the water undertaking was in 1881, at the rate of ¾ per cent. upon the water capital portion (£3 per share) of the then fully paid up 4361 original (since known as "A") shares. It therefore follows that the deficit in respect of dividend No. 1, as regards the water portion of the capital represented by these 4361 shares, amounts to 9¼ per cent. (less income-tax off the 10 per cent.); and it is this deficiency in the first dividend, not giving the full dividend of 10 per cent. to June 30, 1881, which the lucky holders of "A" shares which were fully paid up at that date will in a few days be receiving from the Secretary, Mr. A. G. Readdy. It should, perhaps, be pointed out that 639 out of the 5000 "A" shares were not fully paid at the date named, or not then issued; and these, of course, will not rank for participation in the balance of the 1881 dividend.

METROPOLITAN GAS COMPANY OF MELBOURNE.

Cheaper Gas for Power Purposes.

The Half-Yearly Meeting of this Company was held on Friday, July 28, under the presidency of Mr. J. GRICE.

The report submitted stated that the net profit on the past six months' working, together with a balance of £2926 brought forward, amounted to £55,514. This sum was to be dealt with as follows: Transfer to reserve fund account, £6000; transfer to meter renewal fund, £2000; transfer to gas-stoves account, £2000; dividend at the rate of 5s. per share, amounting to £42,860; leaving a balance to be carried forward of £2654. The Directors expressed their intention of reducing the price of gas used exclusively for motor power to 3s. per 1000 cubic feet as from Aug. 1 last. The balance-sheet showed that the manufacture of gas involved an expenditure of £74,682; distribution, £24,965; and management, £9007. The sale of gas had realized £147,370, made up of £136,533 from meter consumption, and £10,836 from public lighting and gas supplied under contract. Residual products were represented by £34,052.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, remarked that the Company continued to make satisfactory progress. They would all like to see more rapid growth; but nowadays business had to be fought for; and even where it was already in their possession, it had to be held like a fortress against the assaults of the enemy. This fight, like any other, involved continual watchfulness and the best forms of armament, both of which necessitated increased expense; and for this the shareholders had been prepared. Installation of slot meters was going on steadily. Six months ago they had 350 in use; while that day the number was about 1350, and they were being fixed at the rate of some 40 per week. So far, he was glad to say, the returns from the slot meters had justified this enterprise. Referring to opinions expressed at the two previous meetings, that the rent charged for stoves should cover the cost of repairing them (implying that if it did not do so the Company should give up hiring out stoves, and should only sell them), he said that at the first glance this seemed to be a very business-like suggestion; but it lost sight of the main issue. The Company's business was to sell gas; and all else was merely an adjunct for the purpose of increasing the yearly output. If they could make a profit out of the hiring, as at one time they did, it would be very pleasant; but if it involved a loss, they must look on the loss like salaries and wages, as one of the charges necessary to the proper conduct of the business. He said "proper conduct of the business," as the policy of hiring out stoves to consumers was one which was almost universally adopted by gas companies—the object being to make an increased revenue, not by means of the rents received, but by encouraging, and thereby increasing, the consumption of gas. This was the important point; for as consumption increased standing charges were reduced. Thus the cost of production was lessened, which was specially important to them, as their standing charges in the shape of debenture and share capital were larger proportionately to the sales than in the case of most companies. Another reason was that gas-stoves were used chiefly during the day-time; and to a gas undertaking an increased day consumption offered many great advantages. The gas-stoves on hire were, of course, maintained and repaired by the Company; and the cost of doing this work almost invariably exceeded the amount received as rent. In England, the Gaslight and Coke Company had over 200,000 stoves on hire at the end of last year; and though more than £65,000 was received as rent, this amount fell considerably short of the expenditure necessitated by repairs. Last year, in the case of Brentford, the cost of maintenance of stoves exceeded the amount received as rent by over £8000; and the cost to the Leicester Corporation of the same branch of their business was apparently over £10,000. The South Metropolitan Gas Company, of London, had over 220,000 stoves on hire—upwards of 60 per cent. of the consumers having gas-cookers; while, in the Provinces, over 70 per cent. of the consumers of the Leicester Corporation Gas Department had stoves on hire. If their Company could reach such a desirable end, they could afford to lose a large sum, as what they paid out on the one hand would be much more than recouped on the other. In the case of their Company, the amount spent on the upkeep of stoves, over and above that received as rent, amounted on the average to several hundred pounds each half year—a small sum to pay for the great benefits which accrued to the Company as the result of their policy. In some gas enterprises, and especially in one very successful one—the Manchester Corporation—consumers were allowed the use of gas-stoves free of charge, the stoves, of course, remaining the property of the Corporation; whereas, in the case of their own Company, they received for rent about £8000 per annum. They were offering every inducement to users to purchase stoves, by naming very low prices and by giving extended terms for payment; but assuming that they decided not to hire out stoves, and that only 50 per cent. of the 8500 hirers declined to purchase, the Company would, averaging the consumption of gas at some 17,500 cubic feet annually per stove consumer, lose in revenue about £18,600 a year. In the course of some remarks on the supersession of electricity by gas in various parts of the world, the Chairman referred to some installations of "Millennium" lights which the Company have made for the purpose of showing what can be accomplished by means of gas. Turning to the accounts, he pointed out that the receipts from the sale of gas by meter showed an increase over the corresponding half of the previous year of £3795, of which slot meters gave £819. In the item of public lighting and gas supplied under contract there was an increase of £543. Residuals showed little changes, except as regarded sulphate, which exhibited a marked increase in returns, owing to improved make. The balance carried to net revenue account was £72,316, a sum which, with one exception—that of the six months ending June, 1901, which showed £73,698—was the best return for the June half year for the last twelve years. The Directors considered it expedient to place £6000 to reserve fund account, £2000 to meter renewal fund, and £2000 to gas-stoves account; and they were glad to recommend that the dividend should be increased from 4s. 6d.—which has been the rate for four years—to 5s. per share. Nothing was promised for the future; but, under similar conditions—if everything looked as healthy as at present—the Board saw no reason why this rate should not be continued. Alluding to the reduction from 4s. to 3s. per 1000 cubic feet in the price of gas used for power purposes, the Chairman said this was a counter move to the Corporation, who had some time before lowered the price of electricity employed for power from 3d. to 2d. per unit. The arguments advanced in regard to the gas-stove business applied equally to the extended use of gas in engines, which again was a class of consumption almost solely confined to the daylight hours. In making the price of gas for motive power so much lower than that used for ordinary purposes, the Directors were following the usual course adopted in Great Britain. In numerous cases there gas for engines was charged at rates varying much below the ordinary price; while at Nottingham the price paid by large consumers for power gas was 40 per cent. lower than the ordinary rate—the rateable difference now being made by their Company. But they would, of course, remember that the price of gas in England was much lower than in Melbourne, both for lighting and for power. In reference to the price of gas for lighting and heating purposes, if the Board could see their way to substantially reduce this, it would in all probability be followed—as was the experience in other parts of the world—by largely increased sales. In this business, they could not remain stationary; and the Directors were of opinion that it would be in the shareholders' interest, now that a fair dividend was being paid, and when the profits would permit of it, to use them to increase the business by reducing the price of gas for lighting and heating, thereby in the long run increasing the profits also. The litigation which had been taking place between the Company and the Melbourne and Metropolitan Board of Works for some time, in reference to the rating of the gas-mains, had now reached finality by a decision in which the Privy Council had determined that the mains which the Board contended should be rated as sewered properties at 1s. in the £, where situated in sewered areas, were to be regarded as unsewered properties, and rated accordingly at 2d. in the £. They would also have noticed from the Press that the Directors had again felt it to be their duty to challenge the policy of the City Council of Melborne in respect of their charges for the supply of electric current. As the matter was *sub judice*, he did not propose now to say more than that in entering upon these proceedings the Directors were actuated by a desire to protect the shareholders' interests by taking care that the Corporation, in competing with a private undertaking, employing hundreds of its citizens, and paying to it large sums in rates, should do so at all events on strictly legal lines. The Board acknowledged with thanks the good services rendered to the Company by the Secretary, the Engineers, and the other officers.

The report and balance-sheet having been adopted,

The CHAIRMAN, in reply to remarks, said the amount of unaccounted-for gas was 5 per cent. less than was the case some years ago, though it was a little more than in the previous year. The present dividend would not be taken as the high-water mark of success; but the Company had to think of increasing the consumption of gas by lowering the price.

The dividend recommended was declared; and the proceedings closed with a vote of thanks to the Chairman.

AUSTRALIAN GASLIGHT COMPANY.

A Satisfactory Half Year at Sydney.

The Annual Meeting of this Company was held at the Royal Exchange, Sydney, N.S.W., on Thursday, July 27—Mr. G. J. COHEN, the Chairman, presiding.

The SECRETARY (Mr. R. J. Lukey) read the notice convening the meeting; and the report of the Directors and the balance-sheet were taken as read. The report stated that the profits for the half year to June 30, after making provision for bad and doubtful debts, deducting interest on borrowed money, repairs and renewals, depreciation of plant, working expenses, and all other charges, amounted, with the balance brought forward, to £63,041. Out of this, the Directors recommended the payment of a dividend for the six months of 9s. per share on the old shares, and in proportion on the new shares, free of income-tax. This would absorb £56,818, and leave a balance to be carried forward of £6223. The Engineer (Mr. T. J. Bush) reported that the whole of the plant was in good working order. In compliance with the regulations passed under the Harbour Rates Act, 1904, the Company, since March last, had had to pay wharfage dues on all the coal landed at Sydney and Mortlake—thereby increasing the expenditure by over £2000 per annum. Arrangements having been entered into with the Glebe Council, the public lamps in the borough, which were removed in July, 1904, had been re-instated, much to the satisfaction of the residents. The demand for penny-in-the-slot meters had in no way abated; already 20,500 houses having been fitted up by the Company,

The CHAIRMAN, in moving the adoption of the report and the payment of the dividend recommended, said that the operations of the Company last half year had been very satisfactory. The increase in gas consumption was not so great as that for the corresponding period of the previous year; but this was not due so much to the extension of electricity in the city, as to the exceptionally fine bright weather compared with the atmospheric conditions of 1904. The increase, however, was a general one—more particularly noticeable in the newer districts, which would necessitate the laying at an early date of larger and additional mains. Not only had the accumulated stock of coke at the Mortlake works now been disposed of, but so great was the demand at the present time that it was found quite impossible to keep pace with it, notwithstanding that the principal customers in the past—the tramway authorities—had reduced their requirements to a minimum. Other residuals also met with a ready sale. It was hoped that after the withdrawal of the wharfage dues on coal in 1902 nothing more would have been heard of the matter; but in March last the Company were suddenly called upon to pay 3d. per ton on all coal landed at the Sydney and Mortlake wharves—thus increasing the annual expenditure

by over £2000. During the past eight years, the Company had been called upon to meet an additional expenditure, which now amounted to £25,000 per annum, resulting from Federation, State, and Municipal taxation, and increased wages under the Arbitration Act. But for these additional charges, the probabilities were that the price of gas would have been reduced considerably. The imposts named, however, made this impossible. It appeared somewhat incongruous on the part of the municipal representatives to approve of electric cables not being rated, when they so strenuously fought for the rating of gas-mains. The High Court's decision that land, whether occupied on the surface or under ground, was rateable, was very clear; and, in his opinion, this equally applied to electric cables and gas-mains. The lighting dispute at the Glebe was in May last brought to a happy termination by the re-instatement of the public lamps in the borough. The negotiations were carried to a successful issue, with the utmost goodwill on both sides; and the ratepayers had, both publicly and privately, expressed their great satisfaction at the reversion to the original state of affairs. He trusted that the various Councils and the Company would long continue to work harmoniously together. For some time past it had been felt that the office at Parramatta was not suitable for the Company's requirements in the town; and recently on a suitable property being offered, it was purchased and converted into very convenient offices and stores. It was interesting to note, in this connection, that when the Company became the purchasers of the Old Parramatta Gas Company, in 1890, the local Council were paying £7 per lamp per annum for the street lights, and the private consumers 7s. per 1000 cubic feet for gas. Now the charges were £4 per lamp and 4s. per 1000 cubic feet—a change for the better which the inhabitants of that historic borough must appreciate. The penny-in-the-slot meters had been a success from the start. In seven years the Company had fitted up 20,500 houses; and the demand still continued. The benefit from this system of gas lighting was not alone to the Company, for the owners of small tenements found that they could now let them much more readily than formerly, when there was no such method in vogue. After referring to the progress made by gas in Europe, and the recent displacement of electricity by incandescent gas-lamps at the Victoria Station, the Chairman said that coming nearer home he found a similar transformation had taken place at the Adelaide Railway Station. There the Government had entered into a ten years' contract, so satisfied were they with the result of the installation, and the great saving in cost as compared with electricity. At June 30, 1904, the number of public lamps lighted by the Company was 11,175, as against 10,393 this year—being a decrease of 782. It must, however, be borne in mind that the city electric installation had displaced 949 gas-lamps; but, on the other hand, 167 new lamps had been supplied to other municipalities. The popularity of gas for cooking purposes was ever increasing. During the year they had sold just upon 1000 cookers, bringing up the total number of stoves disposed of by the Company to 12,800. No doubt, many thousands more could be added to the number in use, were they in a position to ascertain the sales by representatives of other stove makers in the city. Gas-engines showed an increase of 93: the total now being 706. The day consumption of gas had gone up slightly; the percentage of the total deliveries of gas being now 43·3. The number of consumers was 68,015, or an increase of 3966 for the year. Some 85 miles of mains and services had been laid during the past twelve months; the total mileage at present being 1947.

The report was adopted; and the Directors and officers were thanked for their efficient services.

PROFIT-SHARING AT CHESTER.

Last Thursday the Chester Gas Company's profit-sharing employees held a meeting at the works to receive the annual report and statement of accounts. Mr. John Gamon, the Chairman of the Company, presided. The Secretary (Mr. F. A. Pye) read the report, which stated that, in consequence of a reduction in the price of gas on Jan. 1, the bonus for the second half of the last profit-sharing year had been increased from 3 to 5 per cent. The total bonus for the year was £228; being an increase of £52. The deposits by employees had been much larger—amounting to the substantial sum of £152; and the total withdrawals for all purposes had been £212—being £60 in excess of the amount deposited. As the withdrawals included payments to workmen leaving the Company's employ, and the sum of about £123 for purchase of £110 of the Company's ordinary stock, the Committee considered the accounts were the most satisfactory they had had to present; and they hoped the gradual accumulation of the funds would be an incentive to greater interest in the scheme and the thrift which it was intended to promote. During the year a scheme for weekly deposits of small amount had been inaugurated by the Committee, and had been utilized by about 30 workmen, who had paid in an aggregate sum of £40. The number of weekly deposits had fallen lately; but the Committee hoped the workmen would again avail themselves of this opportunity of putting to advantage small savings. The accounts showed a balance in hand on the investment portion of the bonus amounting to £298, against £209 a year ago. The balance on the withdrawal portion of the bonus was £255, against £164 a year ago. The report and statement of accounts were adopted. The Chairman said the total amount of stock purchased by the workmen was £210. There were fifteen profit-sharers on the list who had to their credit £10 and upwards; there were now 69 profit-sharers altogether. He could not help rejoicing that the scheme was really working so well; and he gave great credit to the men for their support of it. It had never been pretended to be a mere charity for the workmen. The only way it could be justified was as a fair and reasonable payment by the Company and a fair and reasonable contribution by the men, to the best of their ability, to make their work sound and good. The meeting closed with a vote of thanks to the Chairman.

Reduction in Price.—The Directors of the Lichfield Gas Company have decided to reduce the price of gas from 3s. 2d. to 3s. per 1000 cubic feet, as from the 1st of July last.

GAS AND WATER PROVISIONAL ORDERS OF 1905.

Board of Trade Report.

From a report which has lately been issued by the Board of Trade regarding their proceedings under the Gas and Water Works Facilities Act, 1870, during the past session, it appears that in December, 1904, eighteen applications were made to them for Provisional Orders under the Act. Eleven related to gas, six to water, and one to a combined gas and water undertaking. The amount of capital proposed to be authorized was £288,100 by shares and £92,322 by loan, of which £201,500 share and £68,592 loan capital was for gas, and £86,600 share and £23,730 loan for water purposes.

With regard to gas, four applications—namely, those from Aberystwyth, Bolsover, Formby, and Worthing—were in respect of undertakings already authorized by Special Acts or Provisional Orders, and were for the following purposes: To empower the Aberystwyth Gas Company to raise additional capital, and for other purposes. To empower the Bolsover Gaslight and Coke Company, Limited, to raise additional capital, and for other purposes. To empower the Formby Gas Company, Limited, to raise additional capital, and for other purposes. To empower the Worthing Gaslight and Coke Company to construct additional gas-works upon a site adjacent to their existing works, and for other purposes. Six applications—namely, those from Haslemere, Hayling Island, Sandiacre, Staveley, Tavistock, and Ystalyfera—related to existing unauthorized undertakings, and were for the following purposes: To empower the Haslemere Gas Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas in certain parts of the counties of Surrey, Southampton, and West Sussex, and for other purposes. To empower the Hayling Island Gas Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas in the parishes of South Hayling and North Hayling in the county of Southampton. To authorize T. Hooley, Limited, to maintain and continue existing gas-works, to construct additional gas-works, and to manufacture and supply gas in the parish of Sandiacre, in the county of Derby. To empower the Staveley Gaslight and Coke Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas in the parish of Staveley, in the county of Derby, and for other purposes. To empower the Tavistock Lighting, Coal, and Coke Company, Limited, to maintain and continue their existing gas-works, and to erect and maintain new gas-works, and to make, store, and supply gas within the urban district and parish of Tavistock and the parish of Whitchurch, in the county of Devon, and for other purposes. To authorize John Newton, trading under the name of the Ystalyfera Gas Company, to maintain and continue gas-works and to manufacture and supply gas within parts of the parishes of Llanguicke and Cilybebyll in the County of Glamorgan, and parts of the parish of Ystradyrglais Lower, in the County of Brecknock. One application—namely, that in respect of Stanford-le-Hope—related to the construction of a new gas undertaking, and sought to empower the Stanford-le-Hope Gas Company, Limited, to construct and maintain gas-works in the parish of Horndon-on-the-Hill, and to supply gas in certain parishes of the County of Essex.

Objections were lodged against all the applications except those in respect of the Bolsover and Sandiacre Orders, and were duly considered by the Board of Trade; inquiries being held in such cases as appeared to be necessary. An Order was granted in each instance, with the exception of the Worthing application, subject to such modifications and amendments as appeared to be required. Formal inquiries were held at the office of the Board of Trade in regard to the Hayling Island, Stanford-le-Hope, and Ystalyfera applications; and in the case of the Hayling Island application the Board decided to dispense with the consent of the North Hayling parish meeting and the South Hayling Parish Council, and presented a report to Parliament thereon, in compliance with section 4 of the Gas and Water Works Facilities Act, 1870. Numerous objections having been lodged against the Worthing application, the Board appointed Sir Alfred E. Bateman, K.C.M.G., to hold a local inquiry and to report to them in the matter. The object of the application was to enable the Worthing Gas Company to use for the purpose of manufacturing and storing gas and residual products lands adjoining their existing site which they had already acquired or had an option to purchase. The consent of the Worthing Corporation was produced, subject to some modification of the proposals in the draft Order. Sir A. E. Bateman reported that there did not appear to him to be insuperable difficulties in obtaining a site for the extension of the works elsewhere, and he thought a further opportunity of consideration should be secured to all parties concerned. He was, therefore, unable to recommend the Board to allow the Order to proceed. After careful consideration of the report, the Board decided to refuse the application.

In the following Orders a maximum price of gas was prescribed, power being reserved to the Board of Trade after three years to alter the maximum price or to substitute a standard price with sliding scale: Haslemere, 5s. per 1000 cubic feet; Hayling Island, 6s.; Sandiacre, 4s.; Staveley, 5s.; and Ystalyfera, 6s. By the Formby Order, the maximum price of gas authorized by the Formby Gas Order, 1878, was reduced from 6s. 6d. to 5s. per 1000 cubic feet. A standard price of 3s. 9d. per 1000 cubic feet, with sliding-scale, was fixed in the Tavistock Order. An illuminating power of 14 candles was prescribed in the Haslemere, Hayling Island, Sandiacre, Stanford-le-Hope, Staveley, Tavistock, and Ystalyfera Orders. In the Aberystwyth Order, a provision was inserted to prohibit the undertakers from issuing within twelve months of the commencement of the Order, except with the consent of the Board of Trade, any greater nominal amount of the additional capital than will produce, including premiums, £3000. In the Haslemere Order an agreed clause was inserted, to provide that if after the expiration of four years the undertakers are not furnishing or prepared on demand to furnish a sufficient supply of gas in accordance with the provisions of the Order in any part of the parish of Bramshott, the Local Authority or any company, body, or person may apply for an Act of Parliament or Provisional Order for the purpose of supplying gas in such parish as if there were no company authorized by the Order to supply gas therein. In the Formby

Order an agreed clause relating to the extension of mains for public lighting was inserted. Agreed purchase clauses were inserted in the Sandiacre and Tavistock Orders.

All the six water applications—namely, Denbigh, Dorking, Hayling, Maidenhead, St. Neot's, and Wey Valley—were in respect of undertakings already authorized by Special Acts or Provisional Orders, their objects being as follows: To empower the Denbigh Water-Works Company to raise additional capital, and for other purposes. To empower the Dorking Water Company to extend their limits of supply. To empower the South Hayling Water Company, Limited, to raise additional capital, and for other purposes. To empower the Maidenhead Water-Works Company to extend their limits of supply, and to raise additional copital. To empower the St. Neot's (Hunts.) Water Company to extend their limits of supply. To empower the Wey Valley Water Company to extend their limits of supply, and raise additional capital.

Objections were lodged in respect of all the applications except that of the South Hayling Water Company, and were duly considered by the Board of Trade. An Order was granted in each case, with the exception of the St. Neot's Water Company's application. A public inquiry was held at the office of the Board of Trade with regard to the St. Neot's application. The promoters had previously intimated their intention to confine the application to the extension of their authorized limits of supply, so as to include the parish of Eaton Socon. The consent of the Parish Council was produced, but that of the Eaton Socon Rural District Council and the Bedfordshire County Council was withheld; and the last named authority appeared at the inquiry in opposition to the Order. After careful consideration of the representations made to them at the inquiry, and upon receiving an undertaking from the Eaton Socon Rural District Council that they would "at once take steps to obtain a supply of water for the parish of Eaton Socon under the powers vested in them by the Public Health Acts," the Board of Trade decided not to allow the Order to proceed. The Maidenhead Water Order contains an agreed clause requiring the undertakers to provide a constant supply of water to Maidenhead.

One application—namely, Heathfield—related to a combined water and gas undertaking, and sought to empower the Heathfield and Waldron Gas and Water Company, Limited, to supply water and gas in the parishes of Heathfield and Waldron, and to obtain water and gas in bulk from the Ticehurst and District Water and Gas Company. The application was opposed by the Uckfield and Hailsham Rural District Councils and the Waldron Parish Council, and objections were lodged on behalf of landowners in the district. An inquiry was held at the office of the Board of Trade with respect to the application; and after consideration of the representations made to them at the inquiry, the Board decided not to allow the Order to proceed.

Three Bills were introduced into the House of Lords to confirm the Orders granted by the Board of Trade—namely, the Gas and Water Orders Confirmation (No. 1) Bill, the Gas Orders Confirmation Bill, and the Gas and Water Orders Confirmation (No. 2) Bill. The Gas and Water Orders Confirmation (No. 1) Bill was petitioned against in the House of Lords by the Corporation of Denbigh in respect of the Denbigh Water Order. The petition was heard by a Select Committee; but the Order was passed without amendment. No opposition was offered to the other Bills; and all the Bills received the Royal Assent on Aug. 4.

PROPOSED INTRODUCTION OF ELECTRICITY AT SEATON.

A District Council of Gas Shareholders.

A proposal to introduce electricity into the small Devonshire town of Seaton has given rise to a somewhat curious state of affairs, which is summed up in the following terms by one of the local papers: "A novel situation has arisen at Seaton. Mr. Purvis, Electrical Engineer, of Exeter, has intimated his intention to apply to the Local Government Board for a Provisional Order to authorize an installation of electric light in the town. He is anxious to obtain the assent of the Urban District Council to this project; and he asked the Council to assist in preparing a joint scheme. The matter came before a meeting of that body; and the application was not very favourably entertained. Some of the Councillors thought there was not sufficient scope at Seaton for such an installation. Mr. Purvis pointed out that he had been instrumental in securing installations in other sea coast towns in Devonshire. Teignmouth and Exmouth were mentioned among others; but it was agreed that Seaton could not be compared with those larger towns. For instance, while Exmouth had a population of 11,000, Seaton's population numbered only about one-tenth of that figure. In the course of the discussion, it was stated by Mr. Purvis that no member of the Council who is a shareholder in the Gas Company was entitled to vote on the matter. Then came the rather startling announcement that all the members of the Council were gas shareholders! There is no doubt the law is as Mr. Purvis represents; and it would seem that a deadlock has been created. If no single member of the Council can speak or vote on the subject of the application made by Mr. Purvis, no resolution can be arrived at. The Council cannot even resolve that the application lie on the table. Mr. Purvis said it was the most unique position that had ever arisen in his experience; and he suggested that the Clerk should consider whether the Council were competent to entertain the matter. But Mr. Purvis appears to be 'hoist with his own petard.' He wanted to preclude any hostile action on the part of the producers of a rival illuminant from out-voting his request; and his intimation of the state of the law shut out every member of the Council from giving a vote one way or the other. He must, we imagine, console himself with the reflection that he has not to face any hostile action on the part of the Local Authority. But it is a question whether the Local Government Board will sanction a scheme upon which the District Council has pronounced no opinion, and is precluded from pronouncing any. The situation is truly Gilbertian. Even Mr. Purvis admits it has its comic side." The developments here will be watched with interest.

WINCHESTER GAS AND WATER SUPPLY IN THE OLDEN TIMES.

In connection with the opening of the new Winnall Gas-Works at Winchester—a full account of which appeared in the "JOURNAL" last week—a correspondent of the "Hampshire Chronicle" gave a history of the Winchester Water and Gas Company, some extracts from which will be of interest to our readers at this time. The writer states that, as a school boy, he remembers waiting to see the present town clock, which picturesquely projects from the Stuart Guildhall, lighted with gas, such as it was then; and it was quite an event in the annals of the town. Now there are two, one lighted by electricity, the other by gas. It is, curiously enough, says the old inhabitant, easy for Wintonians to remember oil-lamps in the streets; for a few years ago, in the consulship of Alderman Budden, they were—consequent on friction between the Gas Company and the Corporation—the only means of lighting the streets; and Winchester became a standing joke because of it. Better counsels prevailed after a long eclipse, and the Gas Company resumed illumination, and have ever since held the field. Winchester was "oiled" till 1832, when, I believe, a gas-works was constructed on the present awkward spot by Mr. J. Newington Hughes, a wealthy resident; and after his death the Company was formed—the first Manager being Mr. Bryant, who afterwards went to Australia, and at Sydney made the necessary preparation for the lighting of that city with gas. Subsequently Mr. Angus Croll, Mr. W. U. Tinney, and Mr. F. G. Dexter took prominent parts in the management of the works. Among past Chairmen were the late Mr. C. W. Benny, Mr. W. H. Lipscomb, and Mr. Reeves. Mr. Warner's predecessor in the chair, Mr. W. Barrow Simonds, fought hard at one time to remove the works to a site at Bar End, but was defeated by the Church authorities. The local Company has always and still does rank high as an investment. Mr. Bryant's successor in management, Mr. Sharp, who subsequently became Manager to the Southampton Gas Company, was an enthusiastic and sanguine believer in gas cooking; and his views have been abundantly realized, for "cookers" are now general. A bill published in the city in 1834, reads as follows:—

CITY OF WINCHESTER.

June 2, 1834.

At a Meeting of the Committee appointed by the Commissioners of Pavement at the Guildhall this day, for the purpose of investigating and ascertaining the practicability of completing the lighting of the city and suburbs with gas, the Mayor in the chair, it was resolved that "it is expedient for the furtherance of this beneficial object that a subscription be forthwith commenced in order that a sufficient sum may be raised to lay down the mains; and that in consequence the principal inhabitants of the city and suburbs and gentlemen connected therewith be immediately applied to for their support in aid of the measure."

N.B.—Subscriptions will be received, &c.

As to the Winchester Water-Works Company. It was formed in the year 1850 for the purpose of purchasing the water-works from the first proprietors, and, according to the prospectus then issued "to afford a permanent and plentiful supply of pure water to consumers at the lowest possible price." The capital was £15,000, in 750 shares of £20 each. Before this time, although mains and service pipes were laid down through the whole of the town, the bulk of the inhabitants did not avail themselves of the supply—using their own pumps and wells. This will account for the smallness of the income from the works just before being taken over. It amounted only to about £650, which, it was stated, had been "obtained under very peculiar and disadvantageous circumstances." The prospectus continues: "It may also be observed that the numerous buildings lately erected, and still in contemplation, in the higher and more desirable situations, would never have been undertaken had it been necessary to incur the serious expense of having forcing pumps for raising water from a great depth, and that, with scarcely an exception, all the wells and pumps above the Westgate have been abandoned and a supply from these works introduced." Although the income of the Company increased to about £1000 per annum during the next four years, the concern was evidently not paying its way; for on the 12th of May, 1854, Messrs. Norton, Hoggart, and Trist offered the water-works for sale at the Auction Mart, London. The concern was evidently disposed of; for from another prospectus issued in 1855 it appears that a new Company was formed with a capital of £17,500, in 700 shares of £25 each. At that time, out of 2500 houses in the city, about 700 only were supplied from the works; the annual income was about £1200, the working expenses amounted to about £400 per annum, and (says the prospectus): "It is certain that, under judicious and energetic management, the income will rapidly increase. The profits arising from the present limited operations would produce a dividend of 4 per cent. per annum; and the Directors are justified in stating, from knowledge in their possession, that a larger dividend will immediately accrue, the Company in a short time attain a high position, and the shares become to the proprietors a valuable and remunerative property." These hopes were never quite realized; for ten years afterwards (1865) the Company was incorporated by Act of Parliament with the Gas Company, under the designation of the Winchester Water and Gas Company.

Perth (W.A.) Gas Company, Limited.—The net profit on the working of the Perth (W.A.) Gas Company, Limited, for the half year to May 31 last was £12,098, which, with the amount brought forward (£6626), made a balance of £18,724. This the Directors recommended should be dealt with as follows: A dividend at the rate of 2s. per share on 100,000 shares, £10,000; of 1s. per share on the new issue of 25,000 shares, £1250; carry forward, £7474. Compared with the previous twelve months, the consumption of electric current and gas showed increases of 27 per cent. and 12 per cent. respectively.

LEEDS GAS WORKERS AND THE UNEMPLOYED.

In the course of a discussion by the Leeds City Council on the unemployed question, Mr. Henry pointed out that in the winter time, when lack of work was most acute, there were at the gas-works of the Corporation between 1300 and 1400 men working seven days per week. This seemed to him an anomaly which should not be continued; and as the lowest paid of these men received 24s. per week for 48 hours' work, it could not be said they were underpaid. If the workmen's representatives and the Gas Committee could come together, he thought that a scheme might easily be devised by which by the end of October 120 or 130 more men would be employed six days per week at the gas-works at the standard rate. This was one of the first things the Council should do. Mr. Ratcliffe, the Chairman of the Gas Committee, remarked that the stokers said it was impossible for the Council to compel them to accept a six-day week. Alderman Buckle, however, thought the matter could be settled if the Chairman would guarantee that the men should have a full six-day week. Mr. Ratcliffe replied that he was prepared to at once give such a guarantee. For the purpose of discussing the question, a special meeting of the Gas Committee was held on Friday afternoon. After discussion, the following resolution was passed: "That a meeting of this Committee be held on Tuesday next, at 3 o'clock, to consider the question of making arrangements for the stokers and others working a minimum of six days per week, consisting of six shifts of eight hours, if necessary one of such days to be a Sunday (for which time-and-a-half will be paid), and that the men's officials be invited to attend such meeting." If an amicable arrangement can be come to, it is calculated that about fifty additional men may be employed at the gas-works within a week or two.

PRICE AND QUALITY OF STOCKPORT GAS.

On the minutes of the Gas Committee coming up for consideration at the last meeting of the Stockport Town Council, a lengthy discussion took place. One of the points raised was by Alderman Ferns, who drew attention to an item referring to the Engineer's (Mr. S. Meunier's) report for the year ending March 31, and said that on reading the report he found the question was foreshadowed of the reduction of the gas from 18·08 candle power to (approximately) about 14 candles. He should like to ask whether the Committee were going to take this matter into consideration; and, if so, whether they would carefully consider the question, not only of the household consumers, but also those who used gas for lighting in mills. It seemed to him that this was leading up to universal incandescent lighting—at any rate, as regards households; and whether this system, on account of vibration, would be applicable to mills, was a point which he thought they ought very carefully to go into. In addition to this, he should also like them to consider the question whether, if they were to have incandescent lighting, they should also adopt some proposition by which they might have the incandescent mantles and fittings attended to periodically at an inclusive price, which would not cause the cost—that was the cost of attending to the lights taken with the lower price of gas—to exceed the price of gas as at present.

Next, Mr. Newton referred to a letter that had been received from the Cotton Spinners' Association, on the subject of the price of gas. The Association desired that the gas used at their seven mills should be charged out at the same rate as was fixed for that consumed in engines; but the Committee had felt unable to grant this concession. Mr. Newton said that, to his mind, there was no difference between working an engine by the aid of gas and making yarn also by the aid of gas. It must be borne in mind that gas was absolutely essential for the production of fine yarn, and that a very large number of spindles were at work in the borough, and a large amount of wages paid by the Fine Spinners' Association in this work; and so long as the Association used gas all day, and in some places day and night, he thought the Committee might consent to further consider this very reasonable request. Dr. Marriott supported these remarks, and said that, unless there was some other objection, of which they had not been told, he considered it a very proper thing to reduce the rate for gassing purposes. Alderman Rivett also expressed similar views.

Mr. Glithero asked whether, if it was the intention of the Gas Committee to reduce the candle power to 14, they could expect a large reduction in the price of gas—say, to 1s. 10d. per 1000 cubic feet—especially as they found every year an increased use of carburetted water gas, which could be manufactured more cheaply than coal gas. Dr. Smeeth said that, with reference to the suggested reduction of candle power, the most important consideration, to his mind, was not so much the reduction in price as the ruination of the people's eyesight. He thought this was a question which ought to be of paramount importance to the Committee, as in favour of the provision of incandescent light; otherwise the eyesight of the whole of the inhabitants would be ruined.

In reply, Alderman Clarke remarked, with reference to the point raised by Alderman Ferns, that the question of candle power would probably be argued out by the Committee at some future meeting; but he might say it was their intention to try and reduce the candle power and bring about the adoption of incandescent lighting throughout the borough. Not only this, but they proposed to employ one or two men to go round and see that the mantles were in order. At the present time there were a great many mills using incandescent light; and it was the Committee's intention to have the incandescent light adopted throughout probably all the mills. In answer to Mr. Glithero, he would say that if the reduction of the candle power was decided on, probably the Committee would determine to reduce the price somewhat, but not to the extent suggested by him. As to carburreted water gas, Mr. Glithero's information was wrong, as they had not manufactured any for the last seven weeks. The plant would, however, likely be started again in a few days. As to Mr. Newton's remarks, they had reduced the price of gas for power purposes; but in connection with the Fine Cotton Spinners' Association, though the latter had a number of mills in the town, the Committee could not see their way to reduce the price to them at present. Probably Mr. Newton was not aware that several of the mills in connection with the Association using a large amount of gas were already enjoying a reduction, which was granted in cases where 5 million feet were consumed in one quarter.

The minutes were adopted.

A BURY GAS STOKER'S SUICIDE.

At an inquest which was held on the body of Harry Jackson, which was found hanging from a tree, the widow stated that the deceased had until some days previously been a stoker at the Bury Gas-Works, and that he had told her he was giving up his work on account of some bother with the foreman stoker, and also that the work was too hard for him. Joseph Pearson, the foreman stoker, said he never had a cross word with the deceased, who always did his work satisfactorily. The last conversation he had with deceased was when he told witness he would want another man to help him. Witness replied: "All right; as soon as you require one, I'll put one on." It was very seldom extra men were needed on the work deceased was doing. He was working on the coal-elevator, which, by means of hoppers on a chain, carried the coal to the feeders for the retorts. When the coal ran rather short, and the hoppers could not reach it, it was necessary for the man in charge to do a bit of shovelling. This did not, however, often happen; but when it did, and one man could not keep the hoppers going, an extra man was put on. A man named Berry was sent to assist the deceased; and after one shift the elevator commenced working properly again. Deceased seemed to be satisfied when the second man was put on; and he did not say anything further. Mr. J. H. Walker, the general foreman, said deceased had never complained to him about his work, and they were never unreasonable in any shape or form respecting the weight of coal the men had to put in. He had not had any complaints about the retort-feeders not being properly attended to by the deceased, who had never been threatened with dismissal. The Coroner said it was unfortunate that a man who took up the position of feeling that he was overworked did not appeal to the proper quarter. He did not think Mr. Walker would have hesitated for a moment in looking into any complaint which the deceased had made, if he had only gone to him. The Jury returned a verdict of "Suicide while temporarily insane."

EXPENDITURE ON THE LEEDS WATER-WORKS.

When the minutes of the Water Committee were submitted for confirmation at the last meeting of the Leeds City Council, Mr. Thomson protested against the appointment of an assistant at £300 a year, to help an Engineer who was recently appointed at £1000 a year, and who, instead of effecting economies, had already caused a great deal of expense. Alderman Briggs said that, with regard to the Water Engineer, he thought his appointment had been one of the best economies the city had effected; and if he could get a man of his ability at the same salary in his own works, he would be very glad to have him. Already Mr. Henzel had saved the city between £30,000 and £40,000. He had all the water-works to look after; and it was absolutely necessary that he should have an assistant for this work. Mr. Kinder remarked that, if members would ascertain the facts of the case, they would not talk about extravagance in connection with the Water Engineer. The Deputy-Chairman of the Committee (Mr. Ogden) pointed out the necessity of having an Assistant Engineer to look after the Kettlesing tunnel, which was one of the most difficult engineering tasks in the country. As to the work of the Water Engineer, his appointment was the most economical ever made by the Council. Shortly after he came, he discovered a leak in the Moortown reservoir, from which a pipe had been fixed to the adjoining sewer, with the result that 3000 gallons of water per hour went into the sewer, representing a loss to the city of £1500 a year. This Mr. Henzel repaired, at a cost of £250, and on that item alone had justified his appointment. But at the Kettlesing tunnel he had also saved £1000 by requiring only three shafts instead of five. He discovered that much of the cement work in the tunnel was already cracked, before a single gallon of water had passed over it; and if the work had been completed in this way, the cost to the city would have been enormous. With regard to stone breaking for the work, under the Tory *régime* it was costing 8s. per ton; but, owing to Mr. Henzel's arrangements, it was now costing 1od.—a saving of 7s. 2d. per ton. He discovered, also, that the tunnel had been excavated in many places at altogether wrong levels, whole lengths having had 4 or 5 feet thickness of rock too much taken away, all of which would have to be filled up.

Street Lighting of Pinxton.—At a meeting held for the purpose of considering the adoption of the Lighting and Watching Act at Pinxton, Mr. J. Hayes, the Chairman of the Parish Council, who presided, said that the lighting of the village had been in the hands of the District Council up to the present; and they were now informed that the latter body had obtained powers from the Local Government Board to transfer the duty to the Parish Council. Mr. Cross, the Clerk to the Parish Council, stated that he had written to the Blackwell Rural District Council, in accordance with a resolution, asking for particulars with regard to the cost. He had received a reply stating that the cost to the Gas Company was £123 6s. 10d., and outlay for maintenance £110. It would require a vote of two-thirds of the meeting before the Act (which, if carried, would remain in force for three years) could be adopted. It was unanimously decided that the Act be adopted for the whole of the parish; and it was also agreed that a rate of 3½d. in the pound should be levied on the parish for the purpose.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The meeting of the Waverley Association at Loanhead on Thursday was quite in keeping with the general character of meetings of the Association, in that it was a quiet, homely gathering. Circumstances prevent the members taking a front place in the great world of gas making, and tie them down very much to a life which must sometimes be felt to be somewhat humdrum. But this fact makes the meetings of the Association, when they come round, all the more appreciated. The members get nearer to each other than they do in Associations where there are bigger men; and as they talk of their business experiences, there is a freedom and a cordiality which it is pleasant to see. In his Presidential Address, Mr. J. Tulloch did not get beyond his depth, but confined himself to subjects which touched both himself and his hearers. The discussion of his remarks was on the same lines; and so a comfortable and profitable hour was spent. Loanhead is not, in itself, an inviting place to go to; and there was no such attraction as new gas-works. Yet, in spite of these disadvantages, there was a good muster of members and friends, which may be taken as an indication that the Association continues to be popular in the district to which it appeals, and that the conduct of its affairs, by Mr. W. Young, of Penicuik, the Hon. Secretary, is all that could be desired.

In presenting the accounts of the gas department in the Town Council of Aberdeen on Thursday, Mr. Kemp, the Convener of the Gas and Electricity Committee, said that the total income from the sale of gas was stated at £89,848; being a decrease of £4096 from the figures of the previous year. This, however, was not surprising, when they remembered that to ordinary consumers the price was reduced a year ago by 2d. per 1000 cubic feet, and to prepayment meter consumers by 6½d. These reductions represented a drop in money of over £6000 in the year. The quantity of gas sold had risen 20,051,000 cubic feet in the course of the year; the sale of residual products had produced some £980 less; the revenue from house services was £1023 down; from the hire of gas-stoves it was up £45; and rents and feu duties were down £35. The total income was less by £6089. On the expenditure side, coal cost £1609 less, and purifying materials £482 less. From waste lime there was realized £35 more; water cost £46 more; salaries at works were down £32; and wages of stokers and labourers were £313 less. These reductions in manufacturing costs were all the more gratifying when it was borne in mind that they had been effected in spite of the fact that there were 1500 tons more coal carbonized, and 17,281,000 cubic feet more gas produced. Such a result was highly creditable to the Manager and to the staff under him. Maintenance of works was £605 up, due largely to alterations and extensions going on at the works. Maintenance of plant was down £1003. The total cost of the manufacture of gas was £2792 down. The total expenditure by the department was down £2055; and the balance to the net revenue account was £4034 less than a year ago, which arose from the smaller revenue from the sale of gas. The expenditure on annuities was £59 down; interest on mortgages was £64 up; and the amount carried to the sinking fund was £329 up. The usual £650 for the redemption of annuities had been set aside, as also the customary £300 to the reserve and fire insurance fund. This left a balance to be carried down of £1232, which, with £6625 at credit last year, made a total of £7858 to be carried over to the current year. Gas annuities were £650 less; and loans on mortgage were £7170 up. The contingent fund now stood at £31,998, and the sinking fund at £39,902. Temporary loans were £5040 less; while the reserve and fire insurance fund now stood at £29,361. They would observe that the percentage of loss was again down, having fallen from 5·22 to 4·67. He had much pleasure in again congratulating their new Manager (Mr. S. Milne) and his staff on the very satisfactory results of another year's work. They would observe that the Committee proposed to reduce the price of gas to ordinary consumers by 1d. per 1000 cubic feet, making the price 2s. 9d. They also proposed to make the price of gas to be used solely for motive power 2s. 6d. per 1000 feet. The latter proposal was made in view of the inducements held out by the vendors of suction gas-producer plant to customers to lay down plant of their own. Probably those who had already been induced to instal a plant of their own would not be affected by the reduction, but others who had followed the prudent policy of caution in the matter might find it to be for their own interest to continue that policy, and to wait for further developments before investing capital in plant of their own. The estimated revenue from gas, at the reduced price, was £87,802; and the total revenue was expected to be £107,626. The estimated expenditure was £112,505. After adding the surplus standing at credit now to the estimated income, there was an anticipated surplus on the current year of £2979. In 1900, there were 30,001 consumers of gas on the books of the undertaking; now there are 31,640. In the former year, there were 2444 prepayment meters in use; now there are 6300. In 1900, there were 1630 gas-stoves on hire; now there are 2444. Lord Provost Walker thought it was very gratifying to hear of the reduction in price. The Convener of the Committee, and all connected with the department, were to be congratulated on the position of affairs. The accounts and estimates were adopted.

At a meeting of the Newport (Fife) Town Council on Monday, Mr. J. P. Robertson, the Convener of the Gas Committee, thought it was well that the ratepayers should know something of what had been done in the new gas-works. During the past year they estimated a surplus of £35, and realized £83. In the last year of the existence of the Company, the quantity of gas made was 11,333,560 cubic feet; in the year just closed it was 16,617,700 feet—an increase of 5,284,100 feet, equal to 46·62 per cent. Last year the yield of gas per ton of coal was 10,335 feet. When the Corporation took over the undertaking, there were about a dozen cookers on hire; now they had a total of 190. The average leakage of gas for the past four years was 8·19 per cent.; the average for Scotland being 10·92 per cent. The estimates for the current year proceeded on very cautious lines. They provided for an output of gas 350,000 cubic feet in excess of the quantity accounted for last year; and for a revenue of £3263, and an expenditure of £3259. The estimates also provided for an increase in the salary of the Manager (Mr. John F. Black) to whose energy the success of the gas undertaking was largely due. The Corporation had reduced the price of gas from 5s. 5d. per 1000 cubic feet since they acquired the undertaking to 4s. 3d. They now proposed to make it 4s., less 5 per cent. discount, which would be equal almost to 3s. 9d. per 1000 cubic feet. The gas supplied was of 25-candle power. The accounts were adopted, and the price of gas was fixed as proposed.

The gas stokers employed by the Corporation of Arbroath recently took it into their heads that they ought to share in the unwonted prosperity of the undertaking, and so they applied for an increase of wages. When their demand was laid before the Gas Committee it was mentioned that the stokers' wages were increased three years ago, and that their work had since been lightened, through the introduction of a new retort-bench. It was thought desirable, however, before coming to a decision upon the matter, to ascertain particulars of stokers' work and rates of wages in towns similar in size and situation to Arbroath. This has now been done; and at a meeting of the Gas Committee this week it was reported that the wages of stokers in Arbroath were higher than those which are paid in the other towns that were applied to. The Committee consequently resolved that the application be not entertained.

The annual meeting of the St. Andrews Gas Company was held yesterday. The Directors reported that there had been an increase in every department, and that since the introduction of electric lighting, three months ago, the consumption of gas had increased by 25 per cent. The income from all sources was £9512, and the expenditure £7730, which left a balance of £1782. The quantity of gas manufactured was 50,697,000 cubic feet, an increase of about 2 million feet. The usual dividend of 50s. per share was paid; a sum was placed to reserve fund; and a balance was carried forward. A recommendation by the Directors that the price of gas should be reduced by 2d. per 1000 cubic feet to ordinary consumers, and by 3d. to consumers using prepayment meters—making the prices 3s. 4d. and 3s. 11d. respectively—was unanimously adopted. The Company provide meters free; they also maintain incandescent burners and fix gas-cookers free. A vote of thanks was accorded by the shareholders to the Joint Managers (Messrs. J. & R. Hall) for their successful work during the year.

The Esk Valley Power Gas Act having now become law, it may not be out of place to give some particulars regarding it. The Act has been promoted chiefly by the manufacturers of paper whose mills are situated in the valley of the Mid-Lothian Esk river. For paper making, it is believed, power gas will be more suitable as a motive power than electricity, as heat is derived from it as well as driving power. The authorized capital of the Company is £450,000. This is the first Power Gas Company incorporated in Scotland; and there appear to be only three prior companies incorporated in the United Kingdom—the South Staffordshire Mond Gas (Power and Heating) Company in 1901; the North-Western Electricity and Power Gas Company in 1903; and the Belfast and North-Eastern of Ireland Electricity and Power Gas Company in 1904. Two of these include both electricity and power gas, and all of them define power gas as the producer gas commonly known as Mond gas, and any development thereof approved by the Board of Trade for motive power, heating, or other purposes, except illumination, to which power gas can be applied. In this Act, however, the promoters do not confine themselves to gas made according to Mond's patent or its developments, but include any gas suitable for the purposes contemplated, but excluding illumination. The Company must use ground specially set apart for generating stations; and before beginning the manufacture or supply, they must notify the Board of Trade as to the nature of the power gas proposed to be made. The Board may hold an inquiry on the spot, and hear objections. The quality and price of power gas, and the purposes to which it may be applied, are kept under control. The Company are put under obligation to supply, and incur penalties for failure. As coal and water are largely used in the manufacture of power gas, the Company are authorized to lease coal mines, and to use the coal or water raised from them at their generating stations.

The only other parliamentary powers, relating to gas in Scotland, which were obtained in the last session were those by which the Corporation of Glasgow are empowered to raise an additional £1,000,000 for the purposes of their gas undertaking.

Bolton Gas Workers' Terms of Employment.—On the application of Mr. R. Tootill, the Secretary of the Bolton and District United Trades Council, the Bolton Gas and Lighting Committee have agreed to receive, on Friday, deputation consisting of members of the Trades Council and representatives of the gas workers with reference to the application of the latter for an alteration in the terms and conditions of their employment.

Manchester and the Chorlton Gas Supply.——Upon the recommendation of the Manchester Corporation Gas Committee, Alderman Briggs moved, at last Wednesday's meeting of the City Council, that the Committee be empowered to offer the sum of £50,000 to the Stretford Gas Company for the purchase by the Corporation of the Company's rights and privileges for supplying with gas the district of Chorlton-cum-Hardy, now within the city, such sum to include the purchase of meters and other plant belonging to the Company and already laid; and, further, that the Corporation agree to reimburse the Stretford Gas Company any expense to which the Company may be put in carrying the transfer into effect. Mr. Kay seconded the motion, and it was passed.

Workhouse Lighting by Incandescent Gas.—The City of London Guardians have decided to have their workhouse fitted with incandescent gas-lamps, in accordance with an arrangement proposed by the Gaslight and Coke Company. At present the workhouse is lighted with 535 burners, consuming 3210 feet per hour. The Company propose to substitute 401 incandescent burners consuming 1604 feet per hour. Taking the gain at 1500 feet per hour, the saving would be 4s. 3d. per hour; and allowing three hours each day throughout the year as the time during which the gas is used, the saving would be 12s. 9d. per day, or roughly £230 a year. The outlay on the proposed installation will not be more than £105, and the estimated cost of maintenance £70 per year—showing a saving of at least £160 per year.

CURRENT SALES OF GAS PRODUCTS.

Week ending Sept. 9.

Tar products in London still remain very quiet, as on the whole little is being done. Sixties crude carbolic can be sold at 1s. 8d. net; but makers will not accept this. 90 per cent. benzol is firm at from 9½d. to 9⅝d. net; and makers are well sold. Ordinary creosote of good quality is from 1⅜d. to 1⅝d. net, in bulk. Pitch is at about the same level as the last few weeks, but not much business offers. Sulphate of ammonia is, if anything, firmer; and £12 12s. 6d. to £12 13s. 9d. is the lowest that would be taken for prompt, on Beckton terms.

LIVERPOOL, *Sept.* 9.

Sulphate of Ammonia.

Although demand has been sustained, it has not been sufficient to bring about an advance, excepting in Scotland, where rather higher prices have been paid. The closing quotations are therefore £12 6s. 3d. per ton f.o.b. Hull, £12 10s. per ton f.o.b. Liverpool, and £12 11s. 3d. per ton f.o.b. Leith. There are contracts for September shipment to be covered; but those interested seem less anxious about them than was the case in August when production was smaller. There has been good inquiry in the forward position, but the firmness of makers has precluded much business; buyers' ideas not being above spot values. But while the winter months have been left alone, £12 10s. per ton f.o.b. Leith has again been paid for April-September delivery.

Nitrate of Soda.

In the absence of increased supplies, this article has been steady at 10s. 3d. to 10s. 9d. per cwt., according to quality, on spot; while spring delivery has been very quiet at 10s. 1½d. to 10s. 3d. per cwt.

LONDON, *Sept.* 9.

Tar Products.

There has not been much business doing during the past week; but as a rule markets have been fairly steady. In carbolic acid, business is reported in crude at 1s. 8d. for prompt delivery, but only for small quantities, as manufacturers at present decline to sell forward, except at an increase, which consumers refuse to pay. In Crystals, the German manufacturers appear to be monopolizing the business just at present, and report having secured orders at the equivalent of 6 1/16d. for 39-40 per cent. There is nothing at all fresh to advise in anthracene, there being no business whatever doing in this article. There is still a good demand for 90 per cent. benzol; but there is really very little offering for prompt delivery. Small parcels are reported to have been sold in the North at 9½d.; but London makers are not offering anything just at the present time, and seem inclined to wait before contracting forward. In 50-90 per cent., there is nothing whatever doing just at the moment, and consumers do not seem to take much interest in this quality. Toluol maintains its position, and is in very good demand; but there is practically nothing offering for forward delivery. In creosote, London makers are still very firm in their ideas of price; and business is reported in Yorkshire at prices varying from 1¼d. to 1⅜d. for early delivery. In pitch, the market remains in about the same position. Consumers in South Wales are still desirous of purchasing for delivery over next year, but manufacturers just at present seem inclined to wait rather than offer so far forward. There have been inquiries during the past week from the Continent; but business does not appear to have resulted, as consumers' ideas of values are considerably under those entertained by manufacturers and dealers here. Solvent naphtha is decidedly firmer; and there appears to be a strong demand both for export and home consumption. London makers appear fully sold for early delivery; but in the North, a fairly good business has been done at 9d. for September shipment, while it is reported that 9¼d. has been paid for October-December. There is also a very good inquiry for delivery over the first six months of next year; but makers do not at present care to sell so far forward.

Average values during the week were: Tar, 16s. to 21s. Pitch, London, 28s. 6d. to 29s.; east coast, 28s. to 28s. 6d.; west coast, 25s. 6d. to 26s. Benzol, 90 per cent., 9¾d. to 10d.; 50-90 per cent., 9d. to 9¼d. Toluol, 9d. to 9¼d. Crude naphtha, 3¼d. to 3½d.; solvent naphtha, 9d. to 9¼d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1⅝d. to 1 11/16d.; North, 2¼d. to 2⅜d. Heavy oils, 2d. to 2 1/16d. Carbolic acid, 60 per cent., 1s. 8d. Refined naphthalene, £4 to £8 10s.; salts, 13s. 6d. to 15s. 6d. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

There has been very little business doing during the past week, and the market closes with a very quiet tone. Beckton still quote £12 12s. 6d. in any position; while the South Metropolitan Company ask £12 15s. on their own special terms. In Leith there is not much business to report for prompt; but it is stated that business has been done for the early part of next year at fairly good prices. There is very little offering at Hull for early delivery; and the market value may be taken as from £12 7s. 6d. to £12 8s. 9d. The market is still firm in Liverpool, and £12 8s. 9d. and £12 10s. is reported to have been paid in more than one instance.

Chelmsford Water Supply.—Another stage has been reached in the Chelmsford water supply scheme by the formal opening last Thursday of a new reservoir which has been constructed at a high level on a site 200 feet square. The capacity is 716,000 gallons; and as the old reservoir holds 102,000 gallons, the total water storage now is 818,000 gallons. An electrical recorder has been connected with the pumping-station, 2300 yards distant, so that the depth of the water may be known at any time without leaving the engine-room; while a 10-inch pumping main extends from the Mildmay Road pumping-station. Messrs. Potter and Son, of Chelmsford, were the Contractors for the reservoir, which will cost £4777; but the main was laid by the Council's staff.

"VOLCANIC" (Powder). "VOLCUM" (Paste).

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LEST YE FORGET.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Coal continues a somewhat indifferent market in the country, so far as house qualities are concerned; but, in other respects, it is fairly satisfactory. All classes of engine and furnace coal are in good request. Best slack is scarce, and commands full rates. A dispute over a tender for burgy for the Urban District Council of Stretford last week, resulted in the acceptance of the lowest—viz., 6s. 10d. per ton—against the wishes of some of the members who wanted to give the order to another contractor at 6s. 11d. per ton. Opposition to the lowest tender was silenced when the malcontents were told that if they desired the higher tender they must pay the difference (£10 or £12) out of their own pockets, not out of the pockets of the ratepayers. Quotations are: Best house coal, 13s. to 14s.; seconds, 11s. to 12s.; common, 9s. to 10s.; steam and forge, 8s. to 9s.; engine fuel, 7s. 6d. to 8s. 6d.; best slack, 7s. to 8s.; seconds qualities, 6s. to 7s.; common, 5s. to 5s. 9d. at the pit's mouth. Coal for shipping, from 9s. to 10s. per ton.

Northern Coal Trade.

The coal trade shows a little more activity, and the deliveries are now generally better, but there is some easiness in the steam coal trade. Best Northumbrian steams are quiet at from 9s. to 9s. 3d. per ton f.o.b., second-class steams are 8s. 3d. to 8s. 6d., and steam smalls are a little steadier at 4s. 10½d. to 5s. 6d.—the increased demand for steam coals being one of the features of the trade; and the fact that their price exempts them from duty being one of the causes of this enlarged demand. As to gas coals, there is now a considerable increase in the consumption, which will further improve for at least two months to come. Attempts are being made to unduly force up the prices of some classes of gas coals for delivery over next year; but so far these attempts seem premature. The current quotations are according to quality, from about 7s. 10d. to 8s. 6d. per ton f.o.b.; and the prices quoted for contracts are between these figures. Best kinds of gas coals are not now so plentiful as they have been. Coke is generally firm; but gas coke shows the irregularity mentioned last week. The increase in the production tends to weaken the prices in some districts, so that the price is from 10s. 6d. to 12s. per ton f.o.b. for good gas coke.

Scotch Coal Trade.

Trade continues in a lifeless condition, which is looked upon with some surprise, as it is usual that at this period of the year there is a much better demand than there is at present. It is anticipated in some quarters that the improvement in the iron trade will favourably affect prices for coal. In the meantime, the quotations are: Main 7s. 3d. to 7s. 6d. per ton f.o.b. Glasgow; ell 8s. to 9s., and splint 8s. 6d. to 9s. The shipments for the week amounted to 243,034 tons—a decrease upon the previous week of 718 tons, and of 21,256 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,092,416 tons—an increase of 439,384 tons upon the same period of 1904.

Revival of the Sea Water Scheme for London.—It is reported that a Bill to acquire the necessary powers to pump sea water from Brighton and supply it on the penny-in-the-slot system will be introduced in Parliament next session. Referring to the matter, the "Financial News" says: "The public memory is proverbially short. Possibly that is the case with the promoters of the new Bill. Six years ago a joint-stock scheme was actually brought before the City. The London Sea Water Supply Company was registered, with a capital of £250,000, and offered preference and ordinary capital to the public by means of an advertised and circularized prospectus. The concern was backed up by nobody of note, and the public issue met with a chilling reception."

Protection of Water Areas in Glamorganshire.—The important question of the protection of water areas adjacent to the county of Glamorgan was brought up by Alderman Davies at a meeting of the Sanitary Committee of the County Council on Friday. It was pointed out that the great increase in population, and the fact (emphasized in the County Medical Officer's quarterly report) that in many of the urban districts of the county the water supply was quite inadequate, necessitated urgent precautions being taken to prevent large watersheds in Breconshire and the adjacent counties being secured for the water supply of large towns at a distance. The question of holding a conference with local authorities in all parts of Glamorgan will be brought before the next meeting of the County Council, with the idea of making arrangements at the earliest possible moment, so that a Bill may be introduced into the next session of Parliament.

Gas Exhibition at Devonport.—A gas exhibition promoted by the Davis Gas-Stove Company and Messrs. Willey and Co., was opened yesterday week at the Temperance Hall, Devonport. The exhibition was held under the auspices of the Devonport Gas Committee; and the opening ceremony was performed by Alderman Hornbrook, the Chairman, in the presence of several members of the Committee. Mr. Hornbrook spoke of the advantages of cooking by gas, and said that where the system was tried no one ever thought of reverting to the old method of using a coal fire in the kitchen. He also called attention to some of the modern appliances which were shown in connection with gas lighting. All scientific men agreed, he said, that the cost of gas for almost every purpose was less than half that of electricity. Mr. J. W. Buckley, the Manager of the gas-works, also spoke on the advance of gas lighting, and the advantages which it offers, in the matter of cost, over electric light. Gas would, he said, be used economically not only for lighting, but for motive power and heating. As regards lighting, there was no more economical method than that offered by the incandescent gas-burner; and the fact that Berlin—the best lighted city in the world—was lighted by gas, was a remarkable testimony to the efficiency of this system. Mr. Buckley gave some practical illustrations of the advantages of incandescent gas lighting, and a few hints upon the economical use of gas for cooking and heating. Miss M. E. Betts followed with a cookery demonstration, and has since given two lectures daily to good audiences.

The "Positive"

SAWER & PURVES
MANCHESTER &
NOTTINGHAM.

Gas or Electricity for Llangollen.—A proposal to light the public lamps at Llangollen by electricity instead of by gas as at present, does not meet with the unanimous approval of the members of the Urban District Council. Mr. Humphreys, in vigorously protesting against the change, contended that gas was infinitely the cheaper. Mr. Williams, on the other hand, urged that the tenders showed a saving by the use of electricity. The gas illumination last year cost £360. The Llangollen Gas Company now offered to light the town area for £140 4s., inclusive of extinguishing; whereas the local Electric Company would carry out the same work for £82 10s. inclusive. Mr. Thomson said this announcement was somewhat premature; but a fuller report would be given later.

Liversedge Water Supply.—As a further stage in the controversy with regard to this subject, the Liversedge District Council have issued to the members of the Water Committee of the Bradford Corporation a reply to the recent reports of the Water Engineer. In this statement it is contended that Bradford only undertook to supply Liversedge in perpetuity because the latter had opposed the Corporation's Bill in the hope of being released from their area of supply, because of the inadequacy and insufficiency of the water service generally. But having got the supply direct in 1893, the Liversedge people found that it was not sufficiently abundant and satisfactory to all parts of their district; and numerous complaints had been made ever since, by letters and deputations of the inhabitants, chiefly in the Roberttown area. In reply to these complaints, the excuses from Bradford were of a very varied character. However, it is urged by Liversedge that the supply, especially in the Roberttown district, has hitherto been most unsatisfactory.

A Warrington Water-Works Contract.—A lively debate ensued, at the last meeting of the Warrington Town Council, upon a recommendation of the Water Committee that points in dispute between them and a contractor named Mr. James Lawson should be submitted to friendly arbitration, Mr. Pemberton, a member of the Committee, who opposed the proposal, said the contract in question was one of the largest the Corporation had entered into, and the public would be staggered when they knew the exact amount of it. Alderman Francomb said the contract was an extraordinary one. It was for £24,400; but if water above a certain quantity was pumped they had to pay for the excessive pumping. Supposing the water cost £50,000, it would be cheap at the price; and they ought to be thankful they had such a wonderful supply. Mr. Maginn said that no member of the Water Committee, not even the Chairman, seemed to know the real amount in dispute. If they did not know, how could they expect other members of the Council to sit there and allow them to shuffle out of their responsibility. Ultimately the recommendation was referred back to the Committee. The Council, sitting as a General Purposes Committee, have since appointed a Special Committee to investigate all matters relating to the contract; it being stated that the Contractor's total claim amounted to £57,000.

Fatal Accident at the Carcassonne Gas-Works.—On Sunday, the 27th ult., while some workmen were patching one of the holders, containing about 140,000 cubic feet of gas, at the Carcassonne Gas-Works, the gas became ignited, and a sheet of flame shot high into the air. According to the account of the occurrence given in the "Petit Journal," the crown of the holder was torn open, and two of the workmen were precipitated into the tank, and were drowned. The others sustained serious burns. It is thought the gas was fired by a spark produced in riveting. The holder had been in use for 35 years; and it was intended to thoroughly repair the sheeting, which had become defective.

The Proposed Substitution of Arc Lamps by Gas at Preston.—This is how the "Electrical Times" refers to the proposal to oust the electric arc lamps from the streets of Preston: "Beguiled by the voice of the 'Gas Serpent,' the Streets and Buildings Committee has recommended the substitution of gas for arc lighting in its main streets. Finally, after much consideration and discussion, it was decided to leave the matter in the hands of a Joint Sub-Committee of the Tramways, Fire, and Lighting Committees, with instructions to deal with the question at once. Mr. Oswin Hansom, of Fleetwood, has written to the Preston local press on the subject, giving the comparative results of gas and electricity for lighting in Croydon—a subject which we recently handled." The first part of the paragraph is decidedly interesting; the last sentence shows that Mr. Hansom must indeed be hard up for material in defence of electric lighting.

The Public Lighting of Castle Donington.—For some time past the Castle Donington Rural District Council and the local Gas Company have been at loggerheads with regard to the public lighting. The question at issue is, it seems, not a financial one; the dispute being over the control of the men who look after the lamps, and whose wages are paid out of the rates. When the Council last discussed the matter, the Vice-Chairman (Mr. W. Harvey) said it was highly necessary that the consumption of gas should be regulated; and the Lighting Committee of the Council were the proper authority to regulate it. It was a matter of common knowledge that in several cases the test-meter lamps were burning considerably longer than those which had no meters. He did not suggest that either the Gas Company or the men who were responsible for the lighting were to blame for this; it was due to a defective system which it was desirable to amend. The Lighting Committee effected a considerable saving to the rates last year by their method of regulating the public lighting; but the men would not act upon the direct instructions of the Committee, and this was where all the trouble lay. Mr. Fielding remarked that the Council ought to have some voice in the engagement and the dismissal of the men whose wages they had to pay; but the Company had declined to meet their wishes in any way whatever. Dr. Fletcher was not in favour of leaving the town in darkness if reasonable terms could be arranged; and he moved that the proposals of the Company be accepted. Three members voted for this; all the others remaining neutral.

CARRON Cookers

30 Sizes and Varieties

Hire them out. There is certain satisfaction in them all—a satisfaction which creates good will and ensures the prompt and willing payment of the gas bill.

Write for Terms.

Carron Company.
INCORPORATED BY ROYAL CHARTE

Works:
CARRON, Stirlingshire, N.B.
AGENCIES IN ALL LARGE TOWNS.

A New Reservoir at Douglas.—Last week the Mayor of Douglas, Mr. Joseph Kaye, J.P., inaugurated a new reservoir at West Baldwin, which will more than double the present water supply of Douglas. The reservoir has a storage capacity of over 300 million gallons; and the watershed is all mountain land. The Engineers were Messrs. Hill and Son; and the total cost has been about £90,000. The Mayor, who was presented by Mr. Hill with a silver goblet commemorative of the occasion, said the water was unsurpassed for purity. He added that Douglas had always had a plentiful supply of water; but in view of the number of summer visitors, it was determined to construct this additional reservoir among the mountains. After the water had been turned on, luncheon was served; the Governor of the Island (Lord Raglan) being one of the guests.

Ashton, Stalybridge, and Dukinfield Water Board.—The Ashton, Stalybridge, and Dukinfield District Joint Water-Works Committee have decided to construct a new reservoir in Chew Valley; and at the meeting of the Dukinfield Town Council, on Monday of last week, the purchase of the Ashway Gap estate of 2300 acres was mentioned. The consent of the Council being necessary to the purchase, Mr. Bancroft moved that permission should be given to proceed with the application for a Provisional Order; and the resolution was carried. It was explained that if the Ashway Gap estate was not purchased, a large sum would have to be paid for wayleave and compensation; whereas by becoming the owners of the estate the Joint Committee would save this expense and would obtain a supply of clay for the new reservoir. When the reservoir was finished, the estate could be sold.

Pontefract Gas-Works Purchase Question.—Among the recommendations submitted by the Gas and Water Committee at last Wednesday's meeting of the Pontefract Town Council was one "that the undertaking of the Pontefract Gas Company be purchased by the Council, and that the steps necessary to effect such purchase be taken." This was left over for separate consideration at the end of the meeting; and on a discussion as to whether or not it should be taken in committee, Alderman Wadsworth contended that even the shareholding members of the Corporation had a right to know what transpired in a matter of such moment, and involving so large a cost. Though they could not take part in the discussion or vote, they ought to hear what was done, otherwise one-fourth of the members of the Council would not know what took place. The Town Clerk, however, was against the Alderman in his contention; and consequently the seven members (including the Mayor) who are interested in the Gas Company left the meeting. In the course of the subsequent discussion, the Town Clerk pointed out that to an extent the Council had bound themselves to purchase. A Committee had met the Directors of the Company and submitted certain proposals on which the undertaking should be acquired; and these proposals were now before the Board. Some of the members, however, strenuously denied that they were tied down to purchase; and eventually, it is understood, a decision was arrived at not to adopt the recommendation, but to convene a special meeting of the Council to deal with the question.

The Mishap while Mainlaying at Peterborough.—We are pleased to learn from Mr. John Barton, the Secretary and Manager of the Peterborough Gas Company, that the mishap which occurred the previous week during mainlaying operations in the town (as recorded in last Tuesday's "JOURNAL," p. 635), was not of so serious a character as earlier reports appeared to indicate. The accident was caused by the opening of a 10-inch valve to let the air out of a section of a new 20-inch main that was being laid, without it being noticed that there was a lighted bicycle lamp close by. Only three people were slightly burnt; and beyond this no damage was done.

The Overseers of Manchester have raised the assessment of the Bradford Road Gas-Works from £21,945 (fixed in 1900) to £30,078, and the assessment of the Rochdale Road works from £10,370 to £12,688. Notice of appeal has been given.

The Gas Committee of the Southport Corporation have resolved that application be made to the Local Government Board for their sanction to the borrowing of the sum of £10,000, part of the sum of £31,500 which the Corporation are authorized to borrow for the purpose of providing gas-stoves, &c.

Tenders for £10,000 worth of additional 5 per cent. stock of the Hastings and St. Leonards Gas Company, paying under the sliding-scale at the rate of £6 1s. per cent. per annum, were opened last Thursday. More than twice the amount was subscribed for above the minimum price fixed, and was allotted at the rate of £128 per cent. This will return the investor £4 14s. 6d. per cent.

The Master Brassfounders' Association at Birmingham have agreed that, in view of the recent rises in raw materials, 5 per cent. be added to net selling prices, and discounts reduced by 2½ per cent.; and that, in the event of either a rise or fall of £10 per ton taking place in the market price of best selected copper on a basis of £75 per ton, the Committee shall call a meeting of the trade to consider further the question of selling prices.

Mr. W. H. Bale, of Bridge House, E.C., announces that, owing to the death of his late partner Mr. W. A. Hardy, he has arranged to carry on the business as usual, and in the same names, by taking into partnership his brother Mr. A. A. Hardy, who has had a very large and varied experience in all kinds of retort-settings, embracing inclined, regenerative, generator, and other systems, as well as steam-boiler settings and fire-work of all descriptions.

The Formby Gas Company, Limited, have placed a complete contract with Messrs. Robert Dempster and Sons, Limited, of Elland, for re-modelling the gas-works—including condenser, boiler, exhausters, washer-scrubber, purifier on Green's system, on staging, with superstructure, including a travelling oxide elevator, and all buildings and foundations. The work has to be completed this year, and has to be carried out under the supervision of Mr. J. H. Buckley, the Company's Engineer, and to general plans prepared by him.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ltd.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND, IN ADDITION, 8,150,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

An interim dividend of 3½ per cent.—being at the rate of 7 per cent. per annum—has been declared by the Bombay Gas Company for the half year to June 30. This is an increase of ½ per cent. on the amount paid for the same period of last year.

Some extraordinary scenes were witnessed in Hanley last Thursday morning, owing to a burst at the Hatton works of the Potteries Water-Works Company. People were without water; and residents were to be seen running with jugs and pails all over the district to get a supply, while beer barrels were rolled down the street with water from other sources.

Among many other counties, Suffolk has suffered from the drought of this year; and well-sinking has not always been successful. At Bungay, therefore, as a well was needed at the St. Edmund's Homes, the Town Reeve (Mr. R. C. Mann), who had the matter in hand, invited Mr. Child, the "water finder," to visit the spot. As a result, it is stated that Mr. Child has, with the aid of a simple watch spring found water in several places at a depth of 30 feet.

Leicester is feeling the inconvenience of a curtailed water supply, owing to the continued decrease of the amount in store. It is calculated that, at the present rate of consumption per head, the amount of water available in the three reservoirs—280 million gallons—will last about seventy days; but to this has to be added a small quantity derivable from the Ellistown supply, which, in the period named, would add something like another week's supply. Every effort has been made to discover and obtain auxiliary supplies, but without success—except for the arrangement made with Loughborough, which cannot come into operation for another twelve or eighteen months. As it will be some years before the Derwent water scheme is finished, the Leicester Corporation can only look to a heavy rainfall to help them out of their present difficulties.

APPLICATIONS FOR LETTERS PATENT.

17,368.—Riley, A. J., "Acetylene generators." Aug. 28.
17,412.—Birch, G., "Anti-vibrator." Aug. 29.
17,446.—Waters, E., Christmas, H. B., and Delf, W., "Controlling gas-lights." Aug. 29.
17,456.—Loram, E. R., "Prepayment meters." Aug. 29.
17,464.—Johnson, J. Y., "Hydraulic mains." A communication from the Deutsche Continental Gas-Gesellschaft. Aug. 29.
17,465.—Devonshire, T. E., and Stephens, H., "Pipes." Aug. 29.
17,496.—Martin, J., "Gas-engine." Aug. 30.
17,498.—Hersey, M. H., "Incandescent burners." Aug. 30.
17,508.—Gibson, W., "Acetylene generator." Aug. 30.
17,513.—Atkinson, T., and Siegenberg, L., "Inverted burners." Aug. 30.
17,529.—Monkcom, H. C., "Ventilating-hood for gas-cookers." Aug. 30.
17,571.—Wasmuth, A., "Firing mantles." Aug. 30.
17,591.—Hayes, A. E., "Solution for prevention of breakage of mantles," Aug. 31.
17,599.—Rotherham, K., and Johnson, W., "Prepayment meters." Aug. 31.
17,610.—Perkes, J. W., "Mantle supports." Aug. 31.
17,664.—Bellamy, F. C., "Incandescent burners." Sept. 1.
17,675.—Lynde, G. S., "Causing air or vapour or both to flow through carburettors or other gas apparatus for lighting and heating." Sept. 1.
17,678.—Macfarlane, J., "Combination gas-stove and firelighter." Sept. 1.
17,701.—Wilson, G., and Fox, T., "Gas-meters." Sept. 1.
17,708.—Hartung, C. A., "Gas-analysis." Sept. 1.

WANTED, FOR SALE, CONTRACT, &c. ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

Night Foreman (Abroad). No. 4458.
Fittings Assistant (Abroad). No. 4458
Manager and Engineer. A. F. Phillips, Westminster, S.W.
Foreman. Buckingham Gas Company.
Traveller. No. 4464.
Meter-Maker. Derby Gas Light and Coke Company.
Working-Foreman Gas-Fitter. No. 4463.

Situations Wanted.

Assistant Engineer or Manager. No. 4451.

Agencies Wanted.

Gas Engineering and Manufacturing Companies. No. 4462.

Plant, &c., for Sale.

Hydraulic Main, Dip-Pipes, Bridge-Pipes, W. and P. Valves. Maldon Gas Works.
Lamps.

Plant, &c., for Sale—*Continued.*

Station Governor, Lamp Column. Henley-on-Thames Gas Company.
Steel-Scrubber, Second-hand, or Old Boiler. No. 4465.
Sulphate of Ammonia Plant, &c. No. 4457.
Gas Journals for Sale. No. 4461.

Company Meeting.

British Gas Light Company. London Offices. Sept. 27. Twelve o'clock.

Stocks and Shares.

Colne Valley Water Company. Sept. 21.

TENDERS FOR

Coal.

Broadstairs Gas Company. Tenders by Sept. 30.
Leeds Gas Department. Tenders by Sept. 20.

Coke.

Wandsworth and Putney Gas Company. Tenders by Sept. 22.

Rotary Scrubber-Washer.

Isle of Thanet Gaslight and Coke Company' Tenders by Sept. 21.

Sulphuric Acid.

Leicester Corporation. Tenders by Sept. 23.

Tar.

Chigwell, Loughton, and Woodford Gas Company. Tenders by Sept. 19.
Glastonbury Gas Department. Tenders by Sept. 14.

Tar and Liquor.

Haverfordwest Gas Department. Tenders by Sept. 16.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 674.

Issue.	Share.	When ex-Dividend.	Dividend or Interest & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin 10 p.c.	21½—22½	..	4 13 4
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	May 12	6½	Bombay, Ltd.	6½—7	..	4 12 10
140,000	5	,,	6½	Do. New, £4 paid	5—5½	..	4 14 6
50,000	10	Aug. 31	14	Bourne-mouth Gas and Water	10 p.c.	29—30	.. 4 13 4
251,810	10	,,	7		B 7 p.c.	16½—17½	.. 4 0 0
53,200	10	,,	6		Pref. 6 p.c.	15½—16½	.. 3 12 9
380,000	Stk.	Aug. 16	12½	Brentford Consolidated		250—255	.. 4 18 1
300,000	,,	,,	9½	Do. New		190—195	.. 4 17 5
50,000	,,	,,	5	Do. 5 p.c. Pref.		125—130	.. 3 16 11
206,250	,,	June 15	4	Do. 4 p.c. Deb.		103—106	.. 3 15 6
220,000	Stk.	Mch. 15	11½†	Brighton & Hove Orig.		225—230	.. 5 0 0
246,320	,,	,,	8½†	Do. A. Ord. Stk.		165—170	.. 4 17 1
460,000	20	Mch. 30	10	British		43—44	+1 4 10 11
100,000	Stk.	Aug. 16	6	Bromley, Ord. 5 p.c.		119—123	.. 4 17 7
165,700	,,	,,	4½	Do. do. 3½ p.c.		89—93	.. 4 16 9
500,000	10	May 12	7	Buenos Ayres (New) Ltd.		12½—13	+½ 5 7 8
250,000	Stk.	June 29	4	Do. 4 p.c. Deb.		95—98	.. 4 1 8
150,000	20	July 13	8½	Cagliari, Ltd.		24—26	.. 6 6 11
100,000	10	May 31	10	Cape Town & Dis., Ltd.		17—17½	.. 5 14 3
100,000	10	Apl. 28	4½	Do. 4½ p.c Pref.		10¼—10⅝	+¼ 4 3 9
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.		53—55	+1 5 9 1
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.		102—104	+1 4 6 7
1,400,000	Stk.	Aug. 31	5 5/16	Commercial 4 p.c Stk.		116—119	.. 4 7 6
560,000	,,	,,	5	Do. 3½ p.c. do.		111—114	.. 4 7 9
450,000	,,	June 15	3	Do. 3 p.c. Deb. Stk.		87—89	.. 3 7 5
800,000	Stk.	,,	6	Continental Union, Ltd.		115—118	+1 5 1 8
200,000	,,	,,	7	Do. 7 p c Pref.		137—142	.. 4 18 7
424,070	Stk.	—	5½	Derby Con. Stk.		124—126	.. 4 7 4
55,000	,,	June 3	4	Do. Deb. Stk.		108—110	.. 3 12 9
486,090	10	July 28	11	European, Ltd.		22½—23½	+½ 4 13 7
354,060	10	,,	11	Do. £7 10s. paid		14½—15½	.. 5 6 5
15,223,235	Stk.	Aug. 16	4 4/16	Gas-light and Coke	4 p.c. Ord.	99½—100½	−½ 4 7 7
2,600,000	,,	,,	3½		3½ p.c. max.	92—94	.. 3 14 6
3,799,735	,,	,,	4		4 p.c. Con. Pref.	109—112	+½ 3 11 5
4,193 975	,,	June 15	3	Coke	3 p.c. Con. Deb.	88—90	.. 3 6 8
258,740	Stk.	Mch. 15	5	Hastings & St. L. 3½ p.c.		100—103	.. 4 17 1
70,000	10	Apl. 28	11	Hongkong & China, Ltd.		18½—19½	.. 5 12 10
3,800,000	Stk.	May 12	10	Imperial Continental		216—218	+1 4 11 9
473,600	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.		96—98	.. 3 11 5
175,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.		125—130	.. 4 12 4
561,000	Stk.	Aug. 16	10	Liverpool United A		222—224	.. 4 9 3
718,100	,,	,,	7	Do. do. B		166—167	.. 4 3 10

Issue.	Share.	When ex-Dividend.	Dividend or Interest & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
306,083	Stk.	June 29	4	L'rpool Unit'd Deb. Stk.	111—113	..	3 10 10
75,000	5	,,	5	Malta & Medn., Ltd.	4¼—4⅜	..	5 5 3
560,000	100	Apl. 1	5	Met. of	5 p.c. Deb.	102—104	.. 4 16 2
250,000	100	,,	4½	Melbourne	4½ p.c. Deb.	102—104	.. 4 6 7
541,920	20	May 31	3½	Monte Video, Ltd.		11½—12½	.. 5 12 11
1,565,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.		106—107	.. 4 6 5
406,025	Stk.	June 29	3½	Do. 3½ p.c. Deb.		98—100	.. 3 10 0
15,000	10	Aug. 31	10	North Middlesex 10 p.c.		18½—19½	.. 5 2 7
52,940	10	,,	7	Do. 7 p.c.		13—14	.. 5 0 0
300,000	Stk.	May 12	8	Oriental, Ltd.		145—148	.. 5 8 1
600,000	5	Mch. 30	7	Ottoman, Ltd.		6—6½	.. 5 12 0
168,255	Stk.	—	6½	Plym'th & St'house 5 p.c.		—	.. —
398,490	5	Apl. 28	6	Primitiva Ord.		6⅛—6⅜	.. 4 8 11
796,980	5	July 28	5	Do. 5 p.c. Pref.		5⅛—5⅜	.. 4 6 11
488,900	100	June 1	4	Do. 4 p.c. Deb.		97—99	.. 4 0 10
851,070	10	Apl. 28	7	River Plate Ord.		13—13½	+¼ 5 3 8
300,000	Stk.	June 29	4	Do. 4 p.c. Deb.		96—98	.. 4 1 8
250,000	10	Apl. 13	7	San Paulo, Ltd.		13—13½	.. 5 3 8
70,000	50	July 1	5	Do. 5 p.c. Deb.		51—53	.. 4 14 4
135,000	Stk.	Mar. 15	10	Sheffield A		238—240	.. 4 3 4
209,984	,,	,,	10	Do. B		238—240	.. 4 3 4
523,498	,,	,,	10	Do. C		238—240	.. 4 3 4
126,106	Stk.	Mch. 30	5½	Shrewsbury Ord. 5 p.c.		104—106*	.. 5 3 9
70,000	10	May 31	10	South African		16—17	.. 5 17 8
6,250,000	Stk.	Aug. 16	5½	South Met., 4 p.c. Ord.		132—134	.. 4 2 1
1,895,445	,,	July 13	3	Do. 3 p.c. Deb.		88—90	.. 3 6 8
575,000	Stk.	Aug. 16	5½	S'th Suburb'n Ord. 5 p.c.		122—125	.. 4 8 0
60,000	,,	,,	5	Do. 5 p.c. Pref.		125—130	.. 4 4 7
112,533	,,	July 13	5	Do. 5 p.c. Deb. Stk.		130—135	.. 3 14 1
502,310	Stk.	May 12	5	Southampton Ord.		111—114	.. 4 7 9
87,950	,,	—	4	Do. 4 p.c. Deb.		—	.. —
120,000	Stk.	Aug. 31	6½	Tottenham	A 5 p.c.	122—125	.. 5 0 0
363,020	,,	,,	4½	and	B 3½ p.c.	96—99	.. 4 16 0
125,000	,,	June 29	4	Edmonton	4 p.c. Deb.	105—108	.. 3 14 1
182,380	10	June 15	8	Tuscan, Ltd.		9⅜—10⅝	+⅛ 7 16 1
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.		100—102	.. 4 18 0
30,000	Stk.	Aug. 16	7½	Wands-worth	A 5 p.c.	—	.. —
255,636	,,	,,	6½		B 3½ p.c.	137—140	.. 4 9 3
60,000	,,	,,	5 5/16	and	C 3½ p.c.	113—116	.. 4 13 6
57,564	,,	June 29	3	Putney	3 p.c. Deb. Stk.	82—85	.. 3 10 7
745,872	,,	Aug. 16	5	West Ham 5 p.c. Ord.		103—105	.. 4 15 3
185,000	,,	,,	5	Do. 5 p.c. Pref.		122—125	.. 4 0 0
193,300	,,	June 29	4	Do. 4 p.c. Deb. Stk.		104—109	.. 3 13 5

† Next dividend will be at this rate.

Prices marked * are "Ex div."

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Resists 4500° Fahr. Best for GAS-WORKS.
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HYDRATED OXIDE OF IRON.
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For all Tar Joints.
For all Ammonia Joints.

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THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

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Telephone: 273 CENTRAL.
CHARGING MACHINERY—See Advt. in last week's issue.
SATURATORS—See Advt. in this week's issue.
RAPID CARBURETTOR—See Advt. in next week's issue.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
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JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

SITUATION wanted as Assistant to Gas Engineer and Manager, or MANAGER of medium-sized Gas-Works. Eight Years' Practical Experience in the general management of a Gas-works. Total abstainer. Excellent Testimonials.
Address, No. 4451, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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WANTED for large Gas-Works abroad, a competent Man as above. Preference will be shown for one occupying similar position, or one engaged as Working Manager. Knowledge of Carburetted Water-Gas and Sulphate Manufacture will be an advantage.

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There is also required a YOUNG MAN as Fittings Assistant. Must be a qualified Gas Fitter, able to supervise work and get out designs and estimates. Knowledge of Drawing and Gas Manufacture advisable, but not essential. Engagement in each case for Five Years, with Second-Class passage by Mail Steamer out and home.
Applications, with *copies* of Testimonials, stating Age and Salary required, to be sent to No. 4458, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C., not later than Sept. 15, 1905.

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All in good condition. Will accept small offer to clear lot at once.—MANAGER, Gas-Works, MALDON, ESSEX.

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Apply to Mr. J. CHAMBERS, Secretary to the Henley-on-Thames Gas Company.

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Telephone: 341, AVENUE.

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BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

TAR AND LIQUOR WANTED.
Best Prices paid.
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OVER 2000 INSTALLATIONS IN DAILY USE.
SEE illustrated advertisement in next week's issue.
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MANAGER and Engineer wanted for a Gas and Water Works in Portugal. Knowledge of Portuguese or French necessary.
Applications, stating Experience, to be addressed to A. F. PHILLIPS, 38, Parliament Street, WESTMINSTER, S.W.

FOREMAN wanted for small Gas-Works (5 to 6 Millions) to act as WORKING MANAGER. Must have good Experience in Carbonizing, Main and Service Laying, and Repairs, and the General Routine of Gas Making. To live at House on the Works.
Address, stating Wages required, with Testimonials and all Particulars, to SECRETARY, Gas Company, BUCKINGHAM.

WORKING Foreman Gas-Fitter wanted by a Gas Company in the Midlands. Capable of Advising Consumers in regard to Lighting, Estimating cost and Fitting up premises with latest methods. State Age, Experience, and References, with Wage. Improving position to a really capable Man.
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METER-MAKER wanted in Midlands. Accustomed to Repair Wet and Dry Gas-Meters, Prepayment Meters, and testing same.
Apply, stating Age, Wages required, with full Particulars and References, to ENGINEER, Derby Gaslight and Coke Company, Friar Gate, DERBY.

GAS Engineer, who will be shortly leaving for Japan and the Far East, would REPRESENT one or more GAS ENGINEERING and MANUFACTURING COMPANIES on Commission. Highest possible References.
Address No. 4462, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TRAVELLER wanted for the North of England. One with previous Experience and a Good Connection amongst Gas Managers.
Apply, by letter, to No. 4464, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ROBERT DEMPSTER & SONS, Ltd.
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

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GAS Journals from the year 1888 for Disposal; clean copies. What offers?
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TENDERS FOR TAR.

THE Haverfordwest Town Council invite TENDERS for about 60 Tons of surplus TAR.
Also for the surplus, amounting to about 50 Tons annually, for Three Years ending the 31st of December, 1908.
Price per Ton delivered into Contractor's Tank-Waggons at the Railway Station, Haverfordwest.
Further Particulars to be obtained upon application to J. Gibbon, Manager, Gas-Works, Haverfordwest.
Tenders to be sent to the undersigned not later than Saturday, the 16th of September next.
The Council do not bind themselves to accept the highest or any Tender.

R. T. P. Williams,
Town Clerk.

Haverfordwest,
Aug. 31, 1905.

GLASTONBURY CORPORATION.

(Gas Department.)

THE Gas Committee invite Tenders for the purchase of the surplus TAR produced at their Works from Oct. 1, 1905, to Sept. 30, 1906.
Tenders to state price per Ton in Buyer's Tanks at Glastonbury Station, and to be sent in not later than Thursday, Sept. 14 next addressed to Mr. Jno. Morland, Chairman of the Gas Committee, and endorsed "Tender for Tar."

D. E. Garlick,
Manager and Secretary.

ISLE OF THANET GASLIGHT & COKE COMPANY.

THE Directors are prepared to receive TENDERS for the Supply, Delivery, and Erection of a ROTARY SCRUBBER-WASHER complete, capable of dealing with 2½ millions per day.
Tenders, endorsed "Washer," to be addressed to the Chairman, on or before Thursday, Sept. 21.
Further Particulars may be obtained from the undersigned,

Frank A. Winstanley,
Engineer and Manager.

Offices: The Dane, Margate,

LEEDS CORPORATION GAS-WORKS.

TENDERS FOR COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of about 300,000 Tons of Best GAS COAL, COBBLES, and NUTS, all to be well screened, and free from shale and pyrites, to be delivered at their several Gas-Works, during a period commencing on the 1st day of January, 1906, and terminating on the 30th of June, 1907.
Forms of Tender and further Particulars may be obtained from the undersigned.
Sealed Tenders to be delivered not later than Wednesday, the 20th inst., addressed to the Town Clerk, Town Hall, Leeds, and endorsed "Tender for Gas Coal."
The lowest or any Tender will not necessarily be accepted.

R. H. Townsley,
General Manager.

Gas Offices, East Parade,
Leeds, Sept. 9, 1905.

CORPORATION OF LEICESTER.

SULPHURIC ACID.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the Supply of SULPHURIC ACID made from either native Sicilian brimstone, recovered sulphur, or pyrites. Specific gravity in each case to be stated. The price to include free delivery by rail into elevated tanks, 27 feet high, at the Chemical Works, Aylestone Road. Probable quantity required, about 2000 Tons, to be delivered as required during the ensuing twelve months.
Tenders, addressed to Mr. Councillor Edwards, Chairman, and endorsed "Tender for Acid," to be delivered at these Offices, not later than eleven o'clock a.m., on Saturday, Sept. 23, 1905.
The Committee do not bind themselves to accept the lowest or any Tender.

Alfred Colson, M.Inst.C.E.,
Engineer and Manager.

Gas Offices, Millstone Lane,
Leicester, Sept. 8, 1905.

BROADSTAIRS GAS COMPANY.

THE Directors of the above Company invite TENDERS for the supply of 6000 Tons of Best Newcastle GAS COAL, to be delivered at the Harbour, Broadstairs.
Forms of Tender, or further Particulars, may be obtained from the undersigned.
Sealed Tenders, endorsed "Gas Coal," to be sent in, addressed to the Chairman, on or before Sept. 30, 1905.
The Directors do not bind themselves to accept the lowest or any Tender.

F. Higginson,
Engineer, Secretary, and Manager.

Gas Office, Broadstairs,
Sept. 8, 1905.

CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.

TO TAR CONTRACTORS.

THE Directors of the above Company are prepared to receive TENDERS for the purchase of about 70,000 Gallons of surplus TAR, produced at their Works over Twelve Months from Oct. 1 next. The price quoted must be at per Gallon or per Ton in purchaser's Tank-Waggons at the Company's Works, Snakes Lane, Woodford Green, and no Tar need be taken during the Winter months.
Terms, cash monthly.
Tenders, endorsed "Tender for Tar," to be sent in on or before Tuesday, the 19th inst.
The highest or any Tender will not necessarily be accepted.

F. Smallbone,
Secretary and Manager.

THE COLNE VALLEY WATER COMPANY.

NOTICE is Hereby Given, that it is the intention of the Directors of the above Company to SELL by TENDER NINE HUNDRED NEW (10 per cent. Maximum Dividend) SHARES of £10 each. Minimum Price £21 per Share.
Particulars, with Forms of Tender, can be obtained at the Company's Office, and Tenders must be sent in on or before Thursday, the 21st inst.

By order,
W. Verini,
Secretary.

Office: New Bushey, Watford,
Sept. 1905.

COKE.

THE Directors of the Wandsworth and Putney Gas Company invite TENDERS for the removal of about 10,000 Tons of "Wandsworth" COKE from these works between October 1 next and March 31, 1906.
The Coke to be removed by van or by barge (free waterway on River Thames).
Sealed Tenders, endorsed "Tender for Coke," to be delivered here not later than Sept. 22 inst.
The Directors reserve to themselves the right to accept any Tender in part or in whole, and do not bind themselves to accept the highest or any Tender.
Any further information may be obtained from the Engineer, Mr. H. O. Carr.

Chas. W. Braine,
Secretary.

Wandsworth and Putney Gas Company,
North Street, Wandsworth, S.W.,
Sept. 4, 1905.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 27th inst., at Twelve o'clock precisely, to transact the usual Business, to declare a Dividend for the Half Year ended the 30th of June last, to elect Two Directors in the place of those who go out by rotation, and to appoint Two Auditors.
Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 16th and RE-OPENED on the 28th inst.

By order of the Court of Directors,
H. B. Chamberlain,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
Sept. 6, 1905.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
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11, Bolt Court, Fleet Street, E.C.

HANDBOOK FOR GAS ENGINEERS AND MANAGERS.—By Thomas Newbigging, M.Inst.C.E. (7th Edition. *Price* 18*s. net.*

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PRACTICAL PHOTOMETRY: A GUIDE TO THE STUDY OF THE MEASUREMENT OF LIGHT.—By W. J. Dibdin, F.I.C., F.C.S., late Chemist and Superintending Gas Examiner to the London County Council. *Price* 7*s.* 6*d.*

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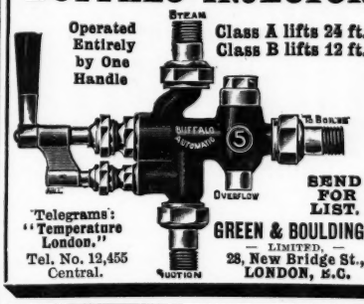

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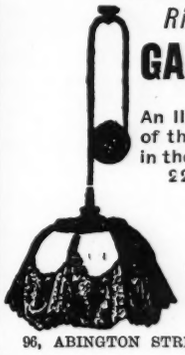
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JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
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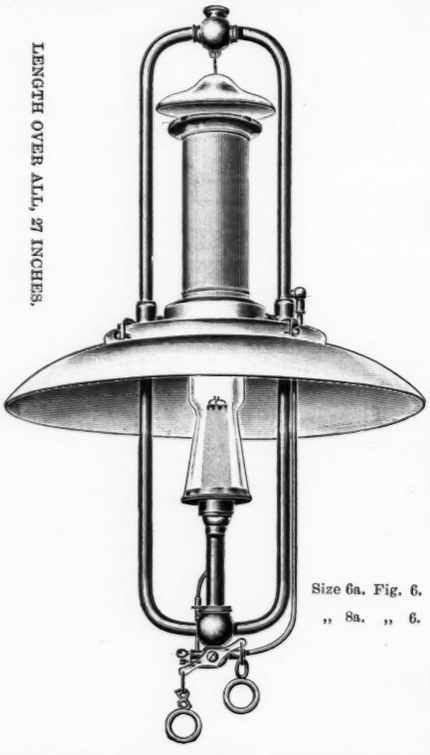

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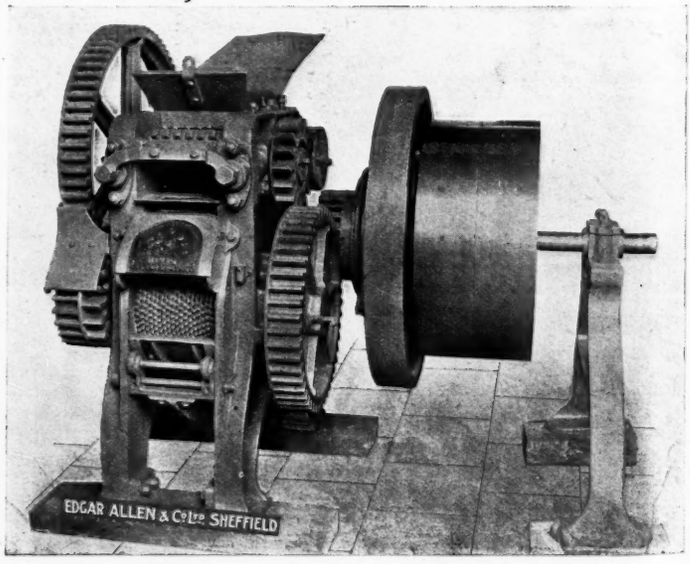

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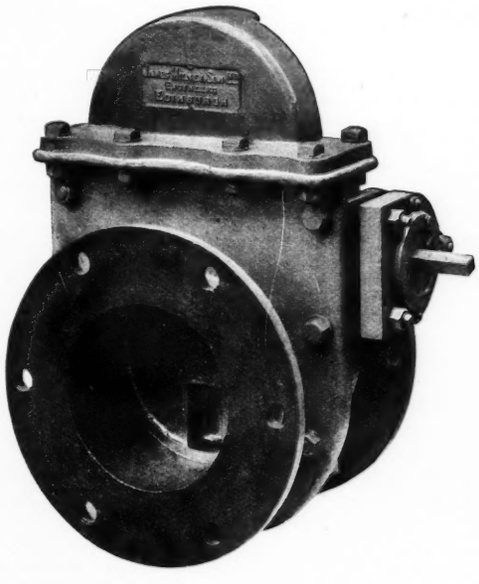

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Illuminating power maintained for 800 to 1000 hours. Average life of Mantle, 1000 hours.

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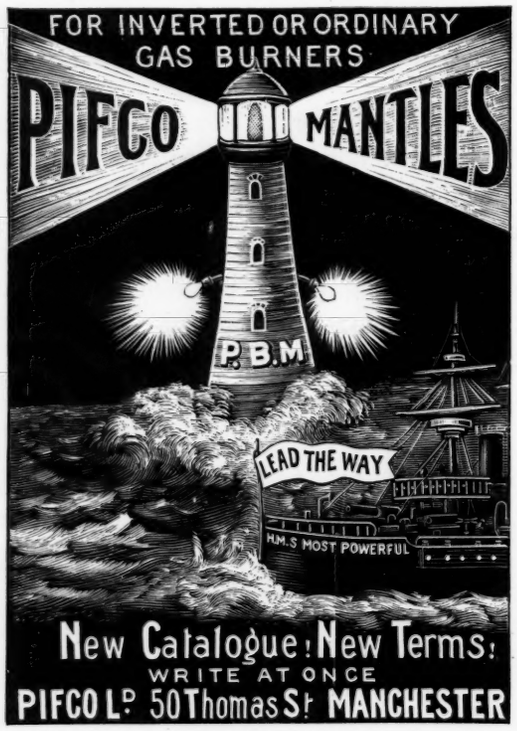

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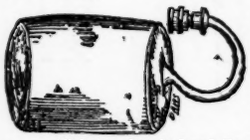

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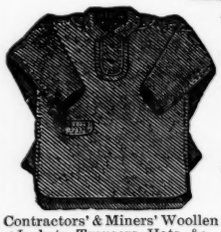

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Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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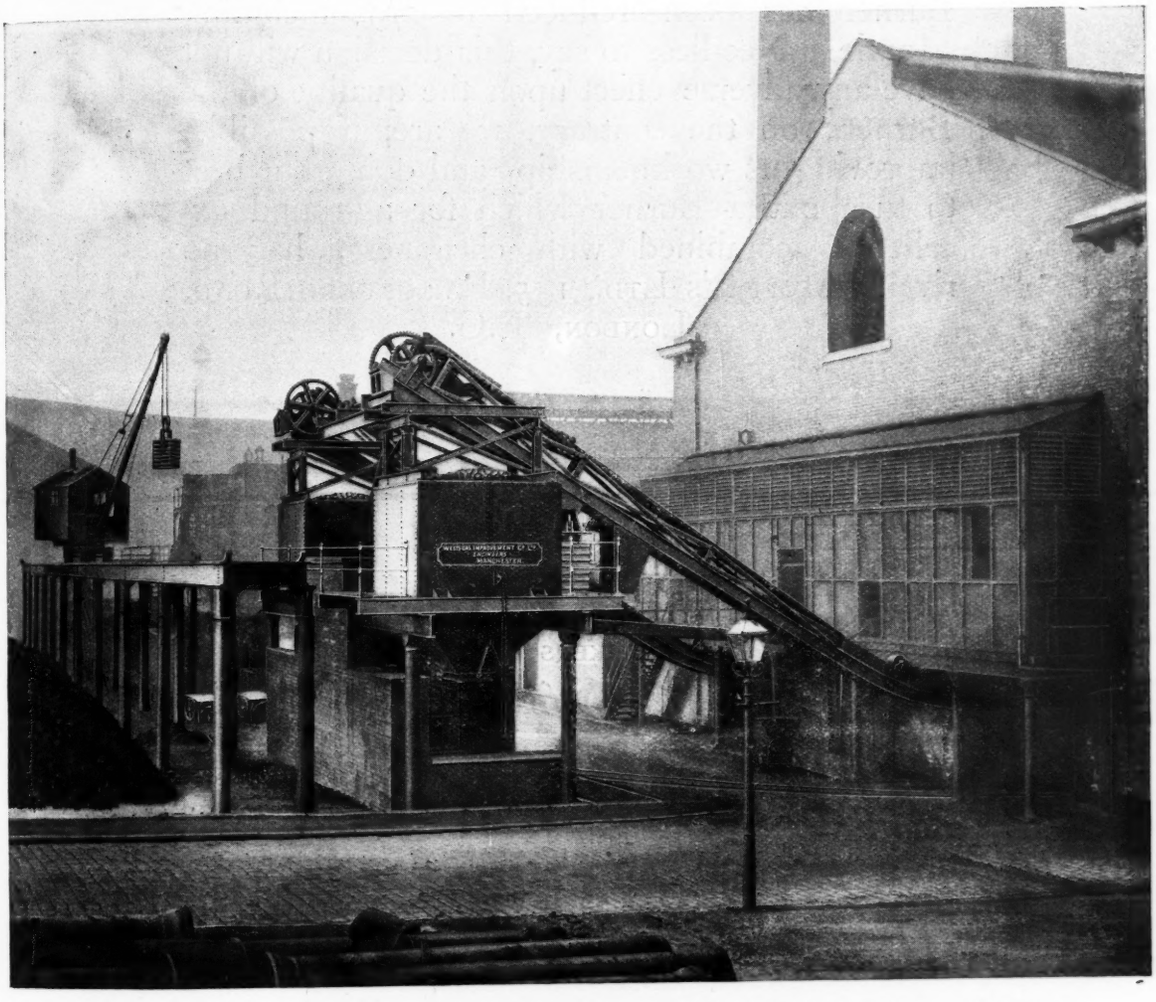

Photograph showing West's Coke-Conveyor dealing with the Coke from Nineteen Through Beds of Retorts.

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With Special Chain constructed with a minimum number of parts, and having Large Joint Pins with ample Bearing Surfaces.

WEST'S STOKING MACHINERY—COMPRESSED AIR DRIVEN AND MANUAL SYSTEMS.

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A cheap thing made cheaper

We beg to notify present and prospective customers that the price of the "K" Inverted Burner has been reduced to 2/9, including Mantle. Needless to say, this decision will not have any adverse effect upon the quality of the Burner; on the contrary, we are, if possible, improving its workmanship, and doing our best to turn out a Burner which for all-round excellence, combined with cheapness, has no rival. MOFFAT'S LTD., 155, FARRINGDON ROAD, LONDON, E.C.

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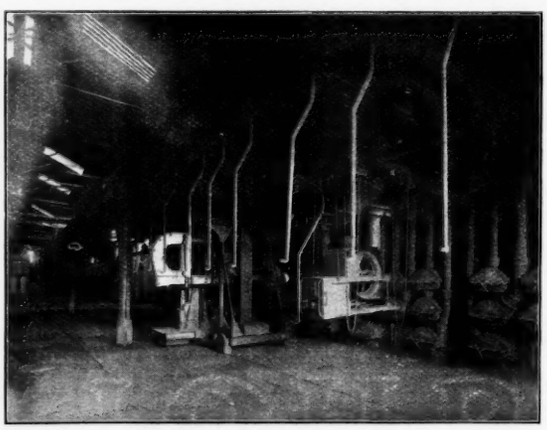

Photo showing the "D.B." Projector and Jenkins "D.B." Discharger at work in the Lancaster Gas-Works.

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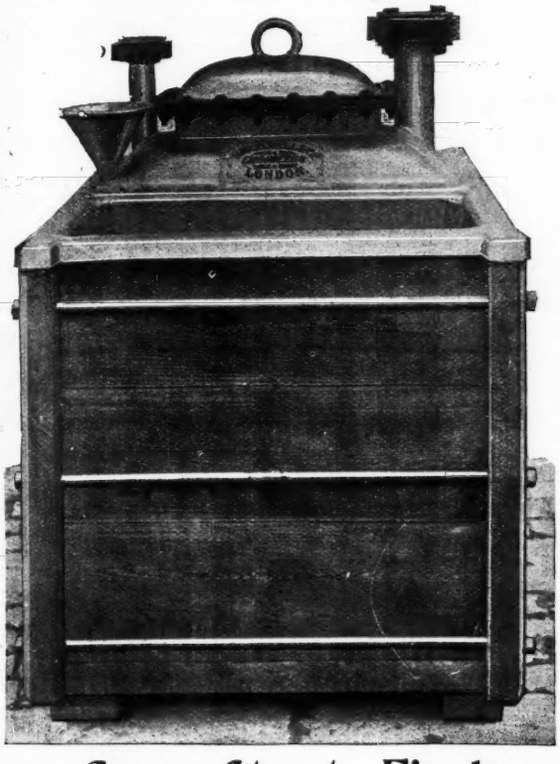

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WHITE SALT FROM COMMON ACID.

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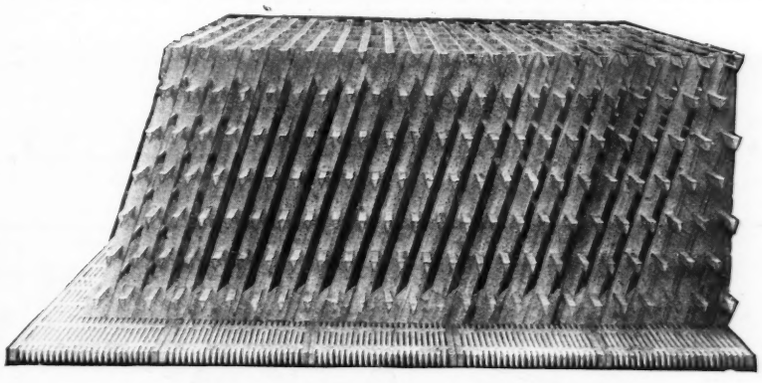
The very best Patent Grid on the Market for Holding Oxide Lightly,

And Holding Oxide Lightly is the Secret of Success for Better Purification.

No Extra Cost in adopting this system to existing Purifiers.

They are Self-Supporting, saving the cost of Standards and Bearers.



Can make the Change from the Old to the New System without any Stoppage.

Simple in Construction and very easy to fix in Position.

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P.S.—My Patent is no Infringement of any other Patents.

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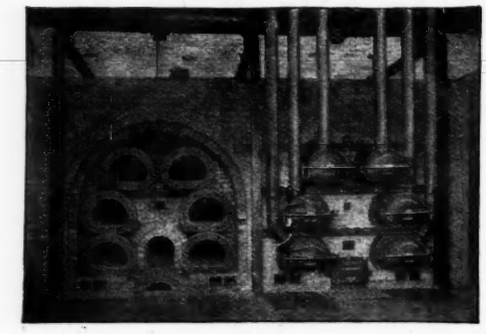

PHOTO. OF REGENERATOR SETTINGS DURING CONSTRUCTION.

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Minimum Fuel Consumption.

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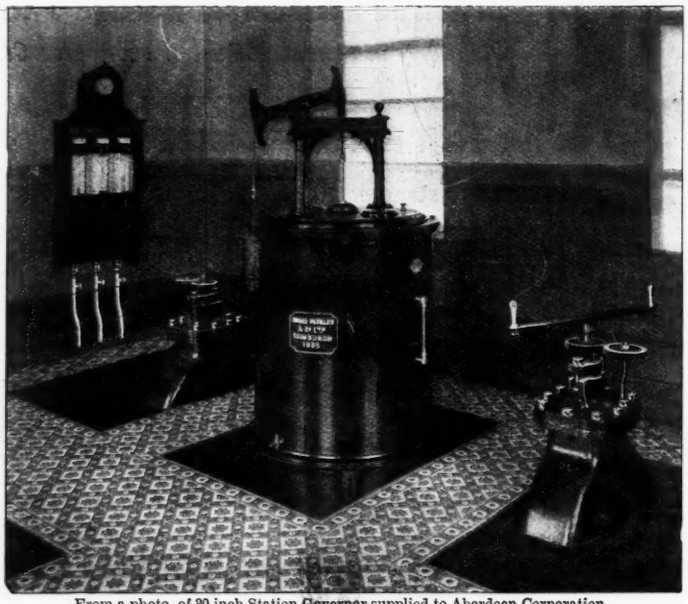
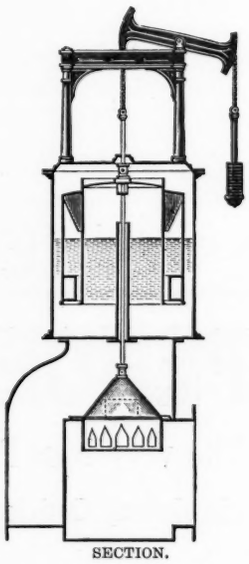
The result of many years' varied experience in their design and manufacture, they effectually Control Pressure under the most exacting conditions.



From a photo. of 30-inch Station Governor supplied to Aberdeen Corporation.



SECTION.

The Bell is enclosed and in communication with the outlet of the Governor, thus responding to the slightest variation in outlet Pressure. Small weights are conveniently placed for operating the Governor, or "The Peebles' System of Air-Loading" from a distance may be employed. All Governors are carefully tested before being dispatched, and the material and workmanship is of the best possible description.

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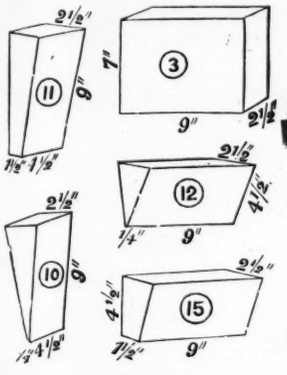

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BRICKS, BLOCKS, TILES, & SHIELDS of any shape made to order.

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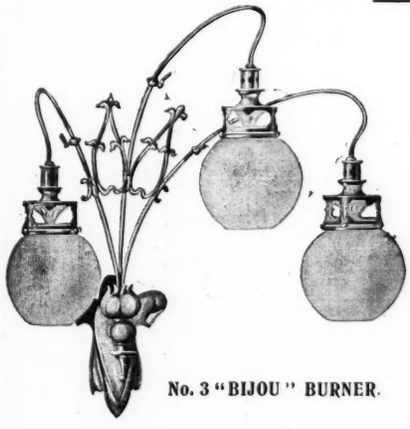

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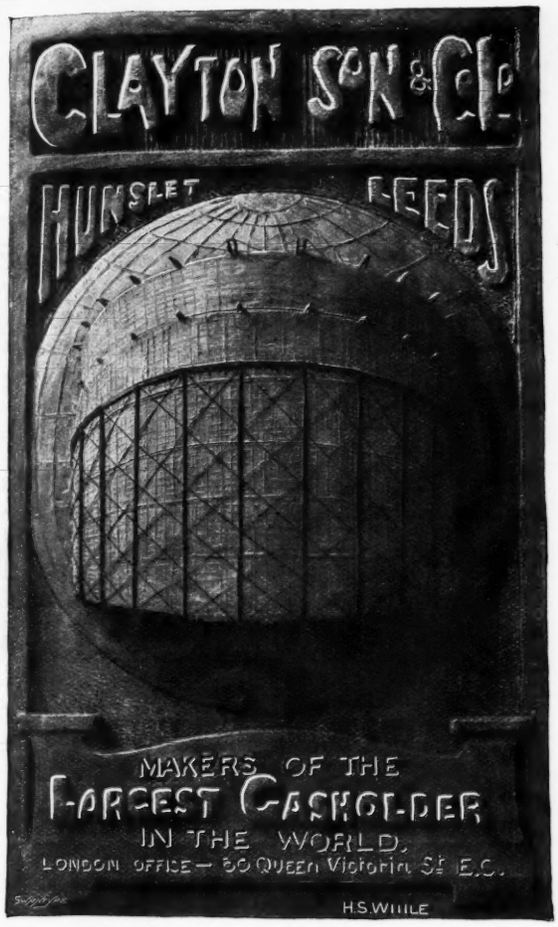

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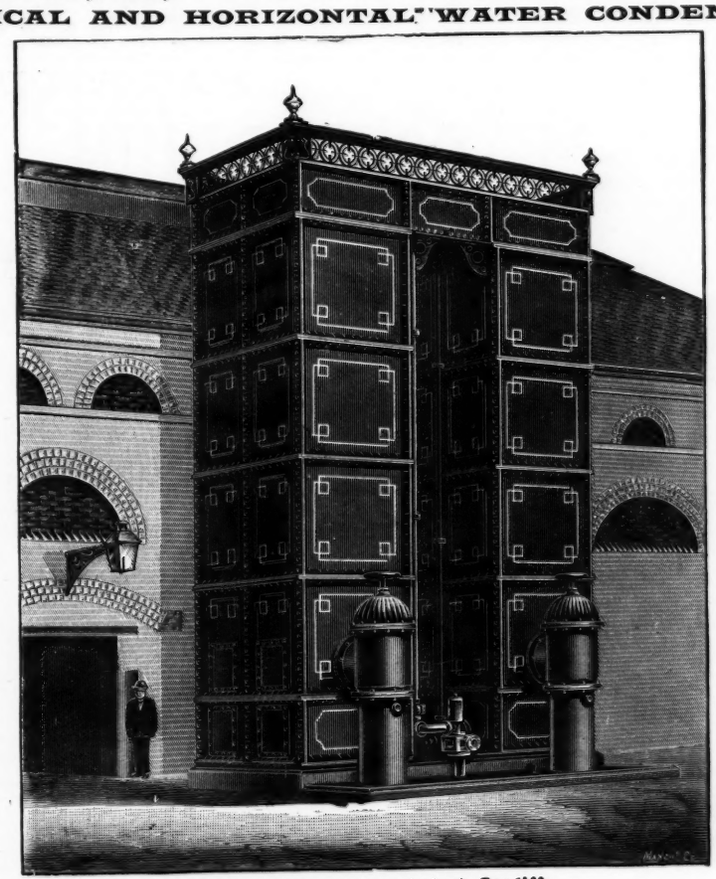

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